

# Onsite Wastewater Treatment Technologies

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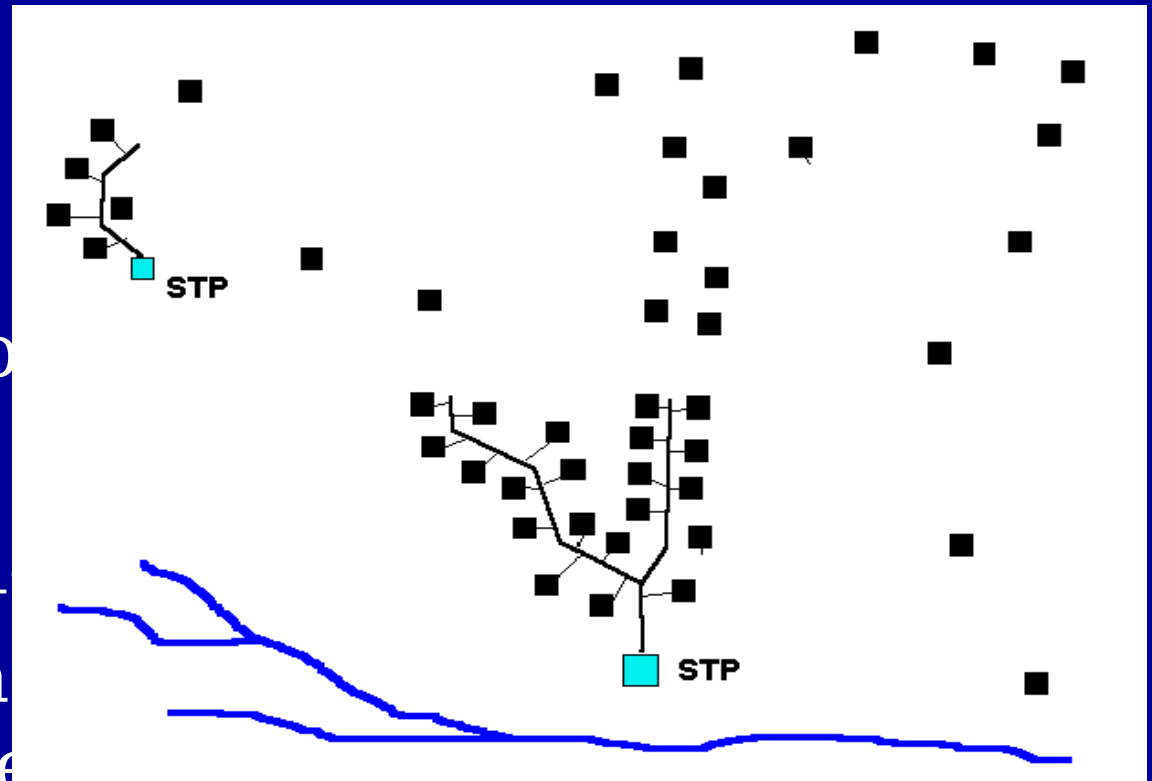
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Texas A&M University System

# Decentralized Wastewater Treatment

- Appropriate cost effective systems.
  - Onsite
  - Cluster
  - Centralized
- Public perception
- Failed systems
- New Technologies
- Different from a centralized sewer





# Onsite Wastewater Treatment Systems?



- Rural and Exurban wastewater infrastructure
- Water Quality Protection
- 40%, Wastewater Infrastructure

# Permitting Dispersal Systems

- TCEQ, Chapter 285, 5000 gallons per day or less
- TCEQ, Chapter 317, Greater than 5000 gallons per day.
- Additional requirements for 317 Permits
  - Potential groundwater impact due to water quality and mounding potential
  - Detailed soil analysis
  - Location of water wells within ½ mile
  - Uniformity of effluent distribution



# Onsite Wastewater Treatment System





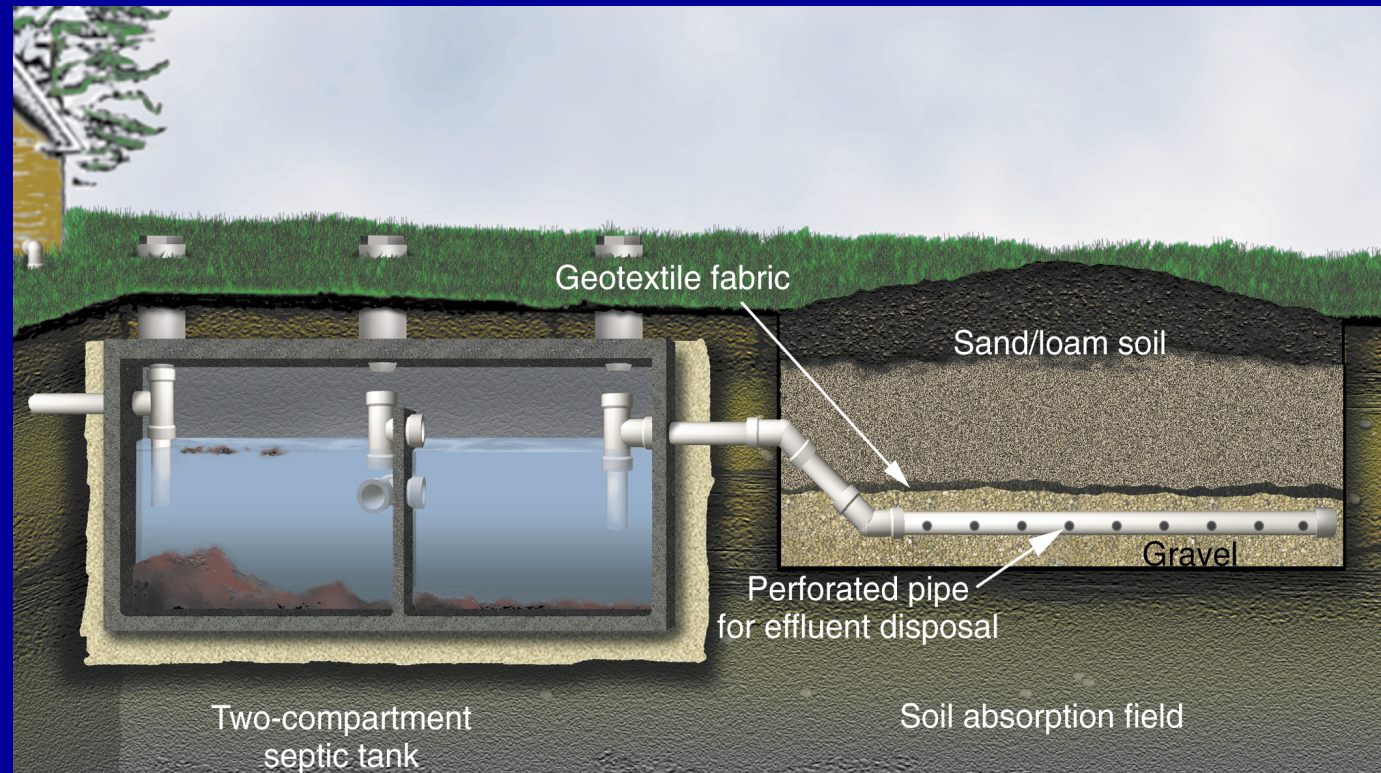
# Failing Onsite System





# On-Site Wastewater Treatment System Components

- Wastewater source
- Collection
- Pretreatment component
- Final treatment & dispersal component



# How do we make the system work?

- Evaluate the wastewater source
- Evaluate site
  - Wastewater treatment
  - Wastewater acceptance
- Choose a final treatment and dispersal component
- Choose the appropriate pretreatment system
- Operation and Maintenance





# Types of Facilities – Wastewater Sources

- Restaurants
- Quick Stops
- Strip Malls
- Residences



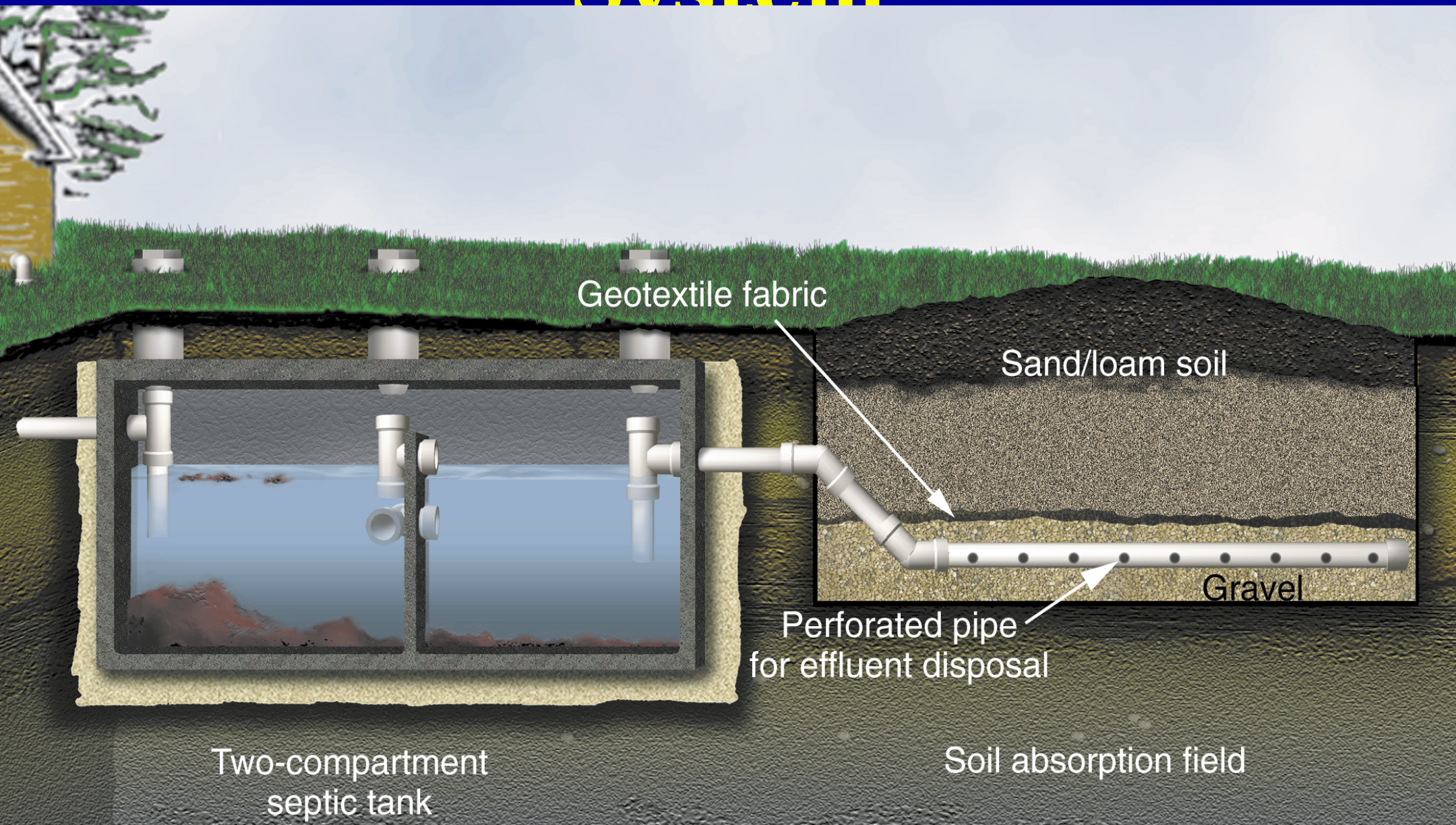
# Wastewater Treatment at a Site

- Soil
  - Type
  - Depth
- Slope
- Restrictive layers
- Separation distances



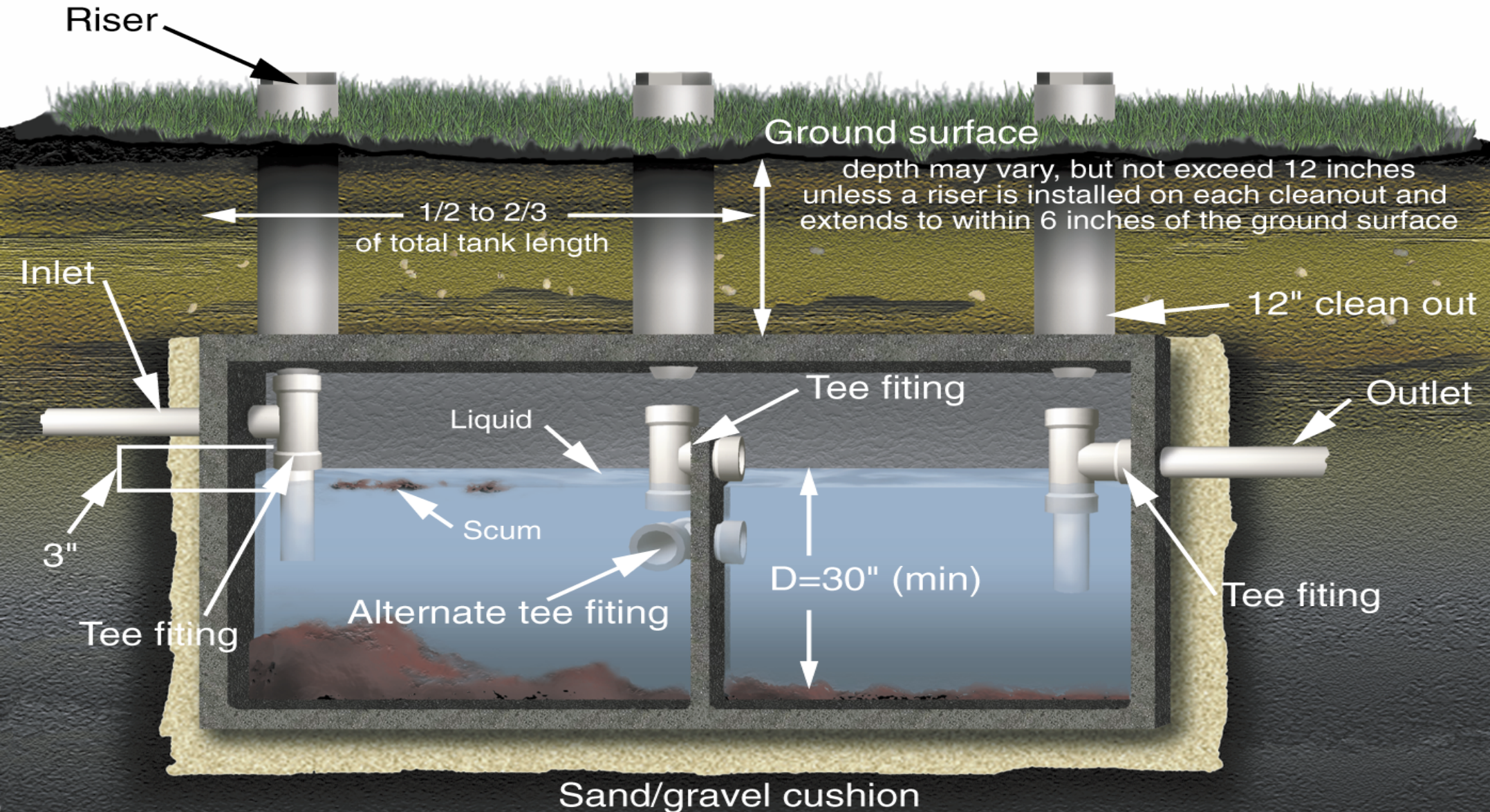


# Conventional Septic Tank System





# Two-Compartment Septic Tank





# Effluent Filter in Septic Tank Outlet





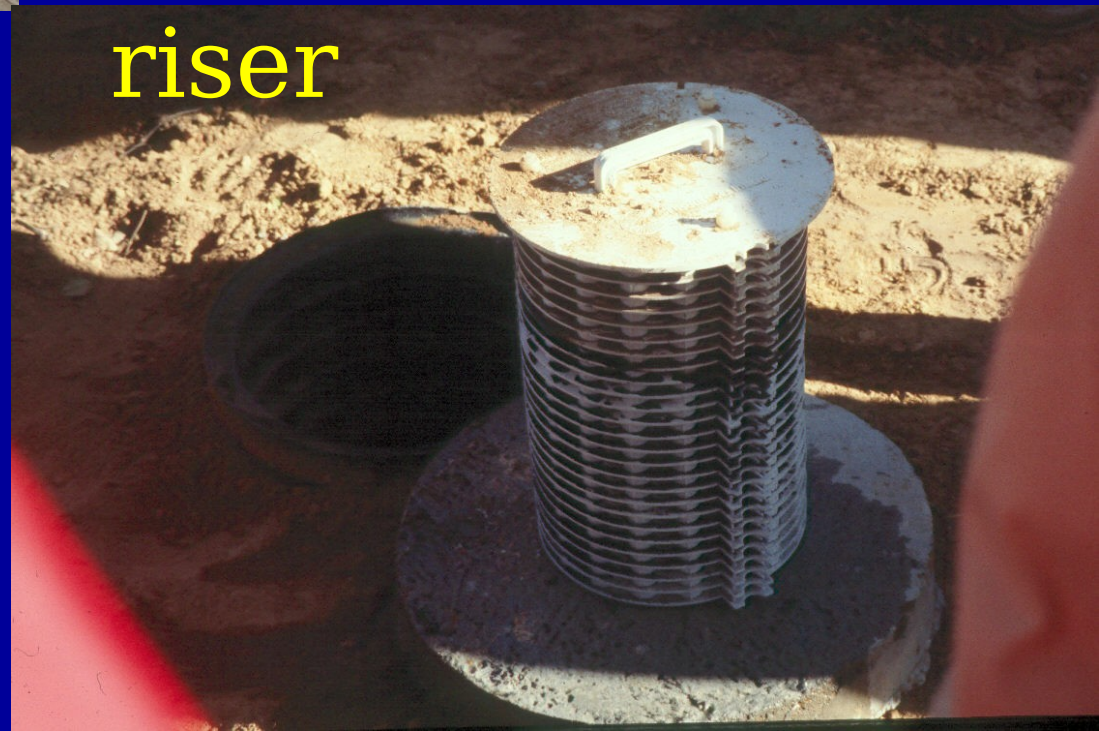


Effluent filter  
holder in septic  
tank outlet

Placement off-  
center in the  
riser

Effluent filter with  
biological material  
attached to the  
surface

Wash biological







Septic tank pumping is a critical component of operation and maintenance.

All materials are removed during pumping.

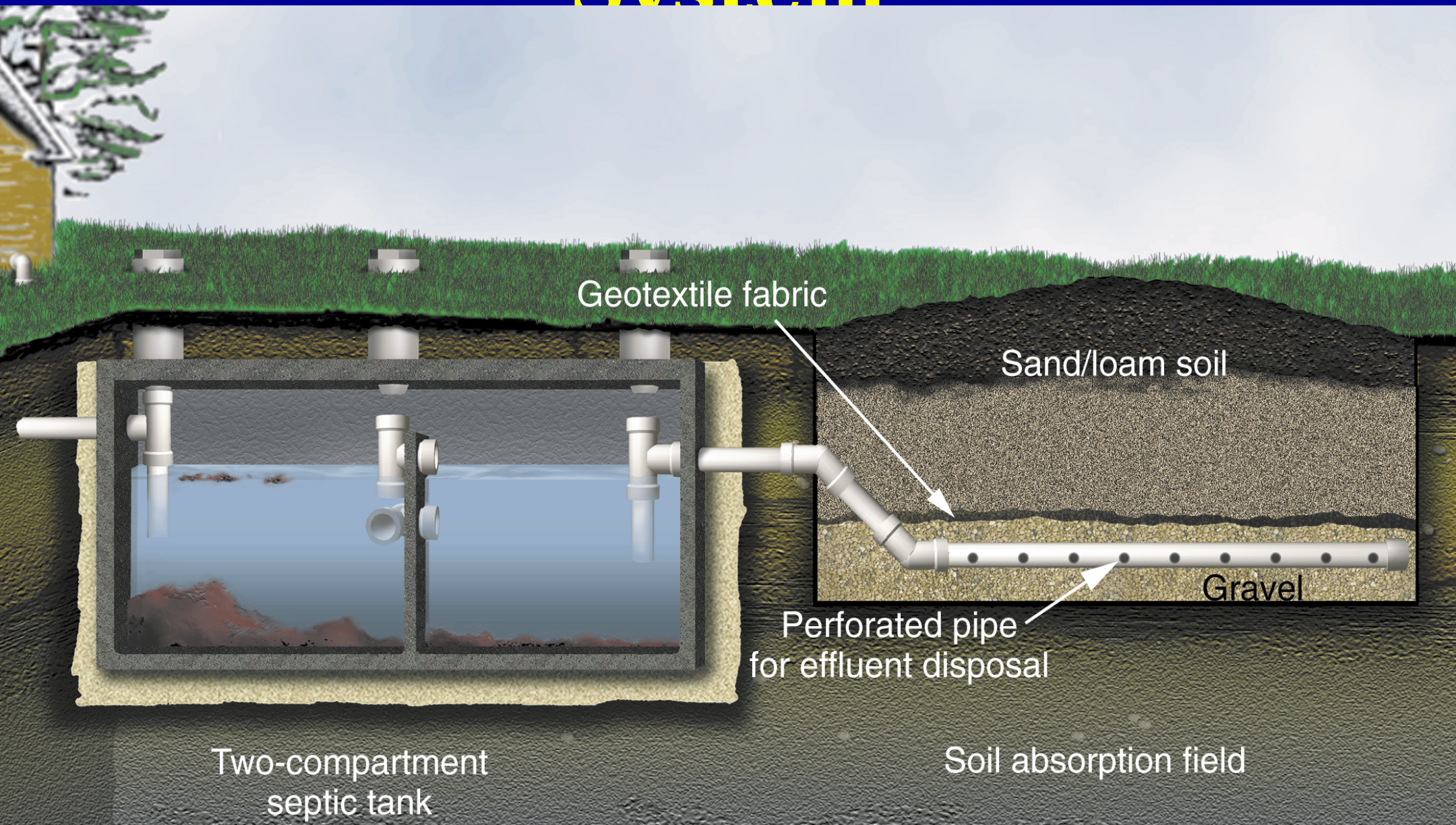
Pumping frequency is a function of system size and loading

Generally pumping frequency is every two to three years.



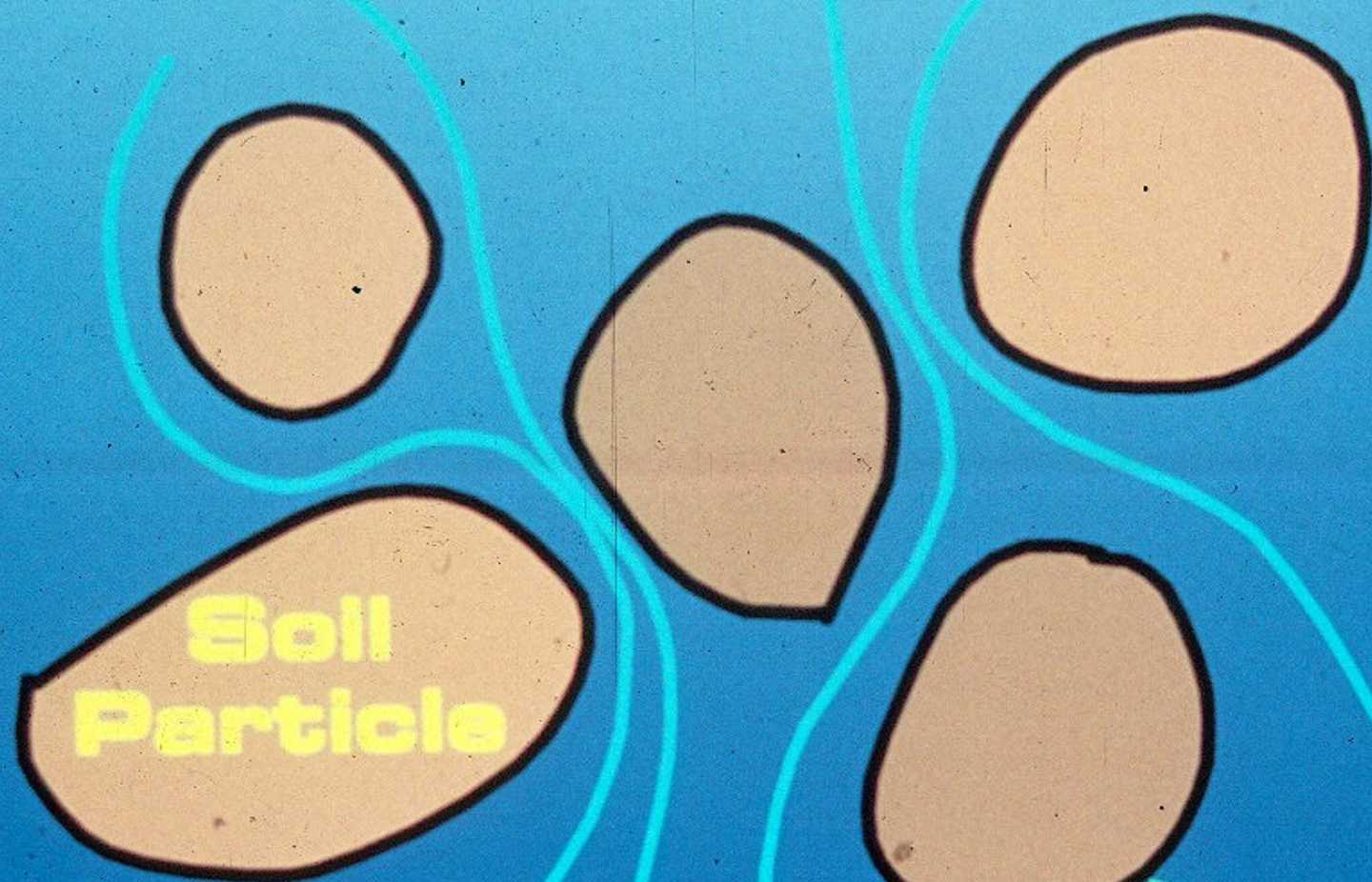


# Conventional Septic Tank System





**Wastewater**

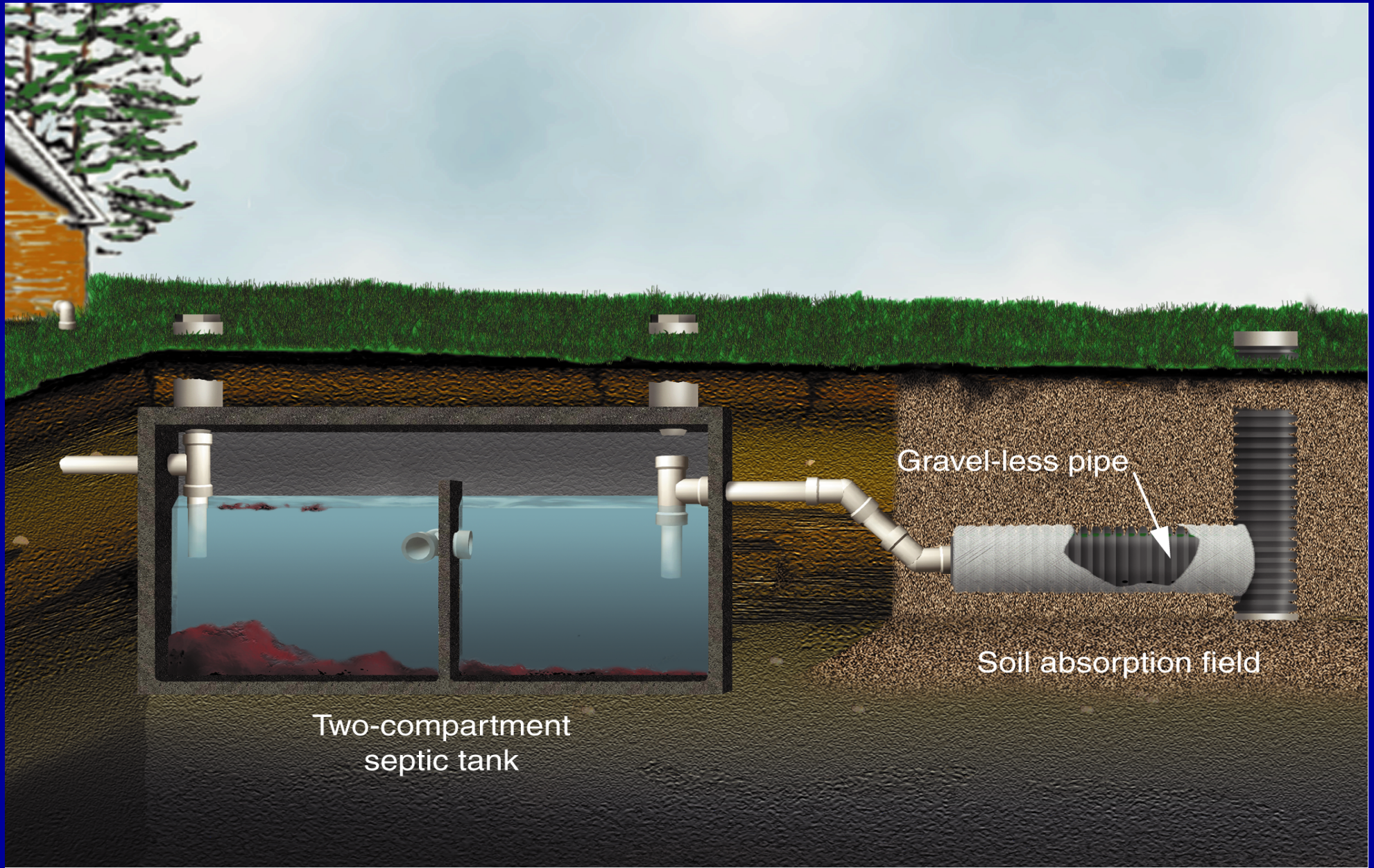


**Soil  
Particle**

**Biological  
Film**

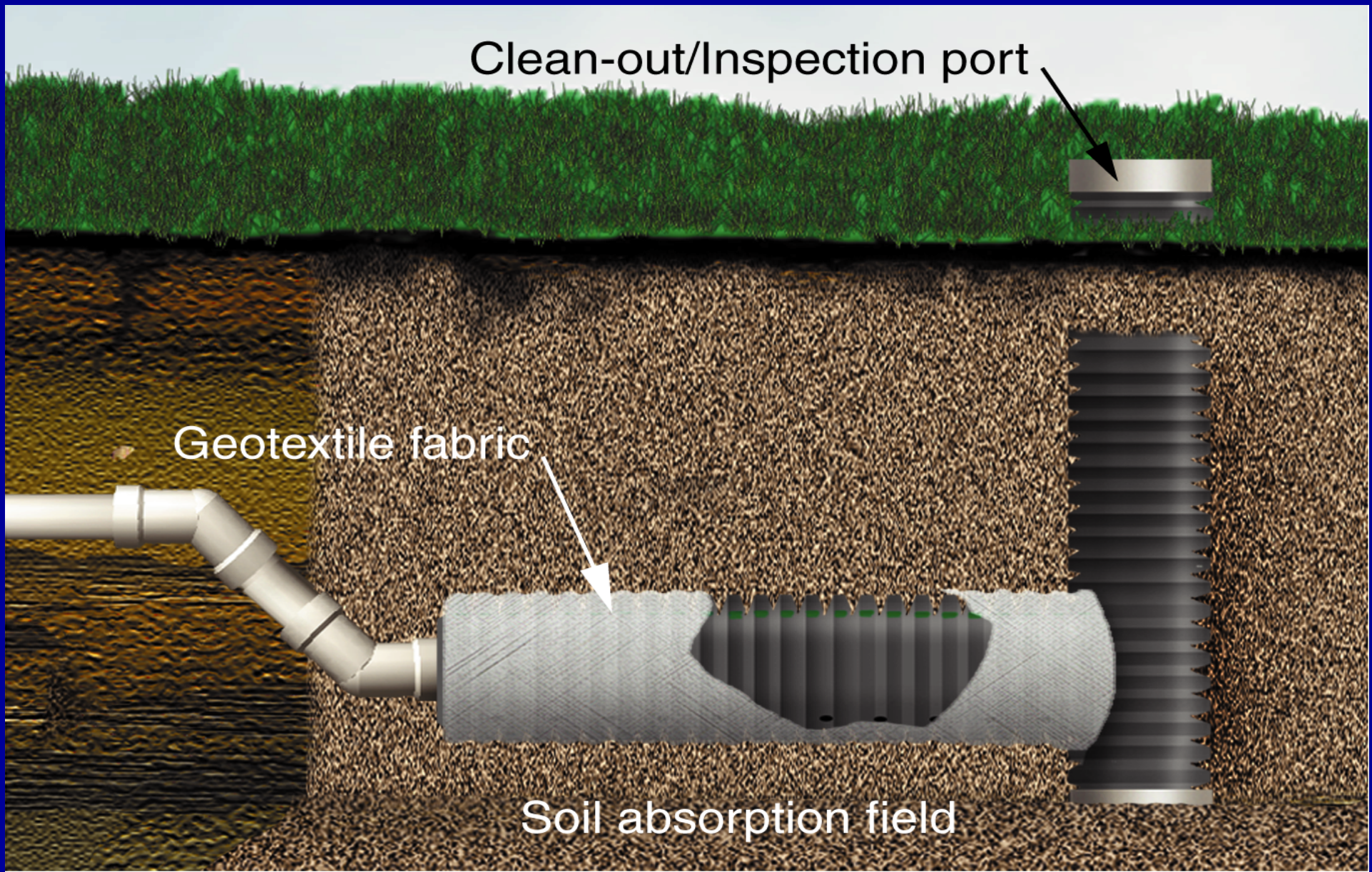


# Gravel-less Pipe System





# Gravel-less Pipe Drain Field







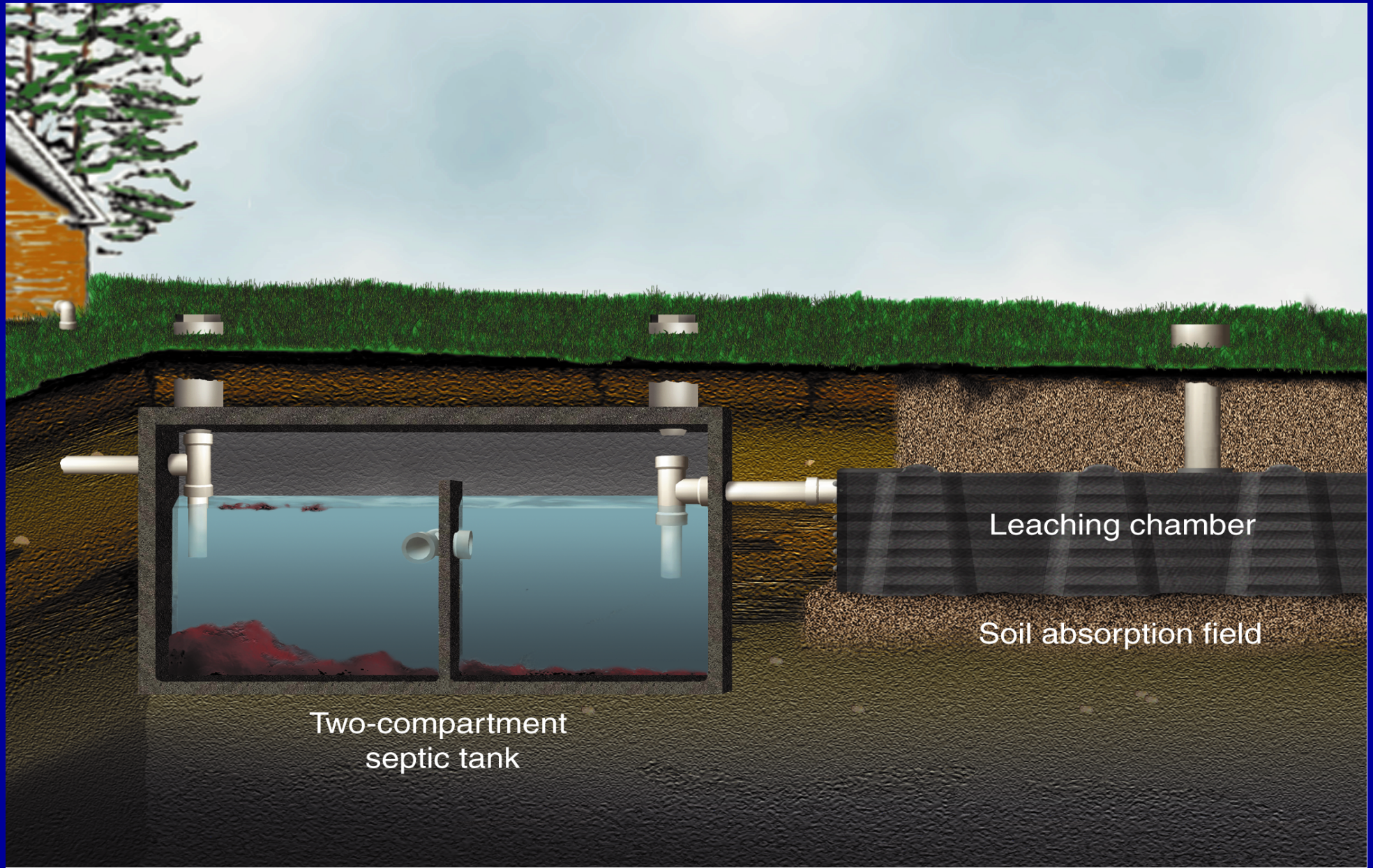
Light-  
weight for  
carrying  
into the  
site.

System can be  
installed to  
follow contour  
of the site.



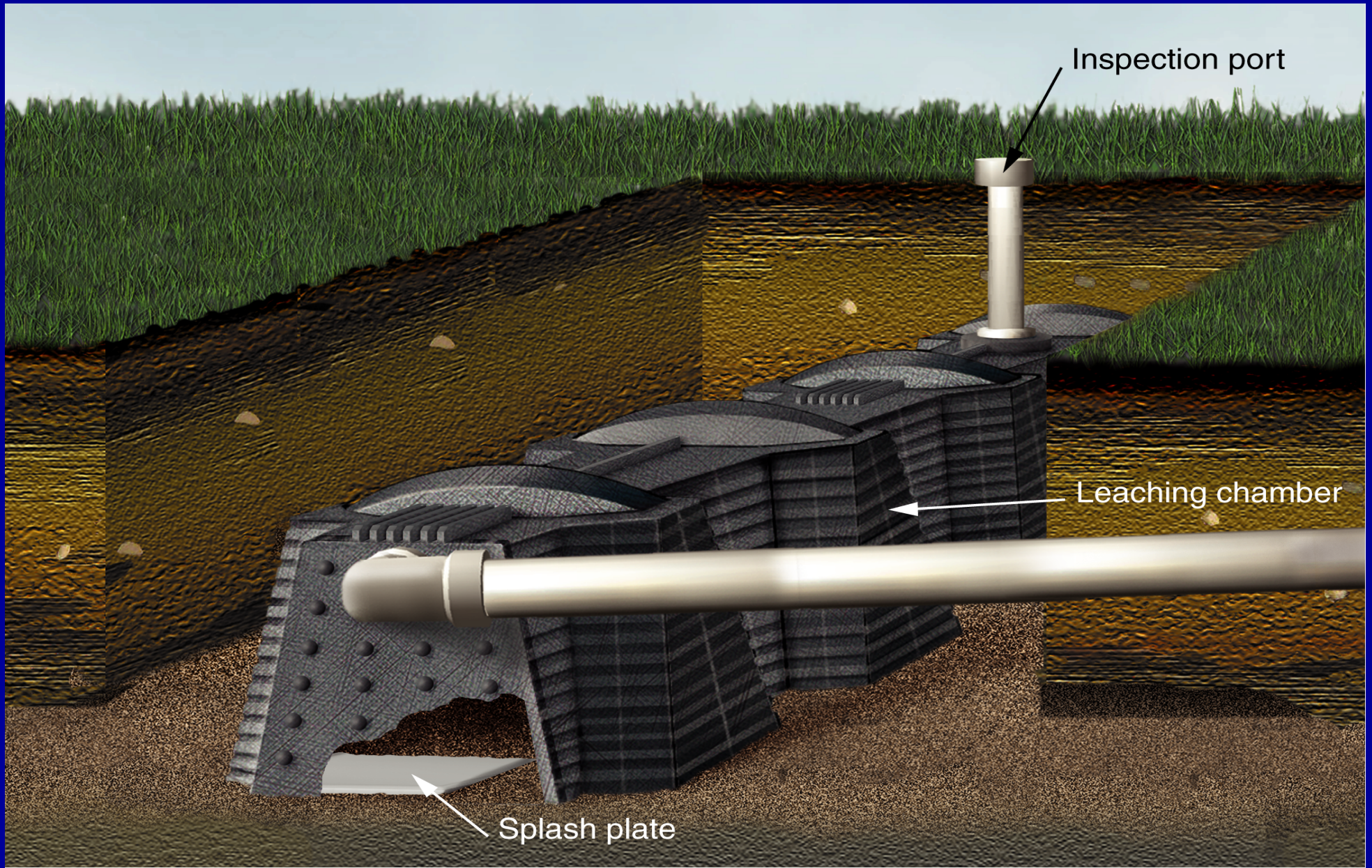


# Chamber System



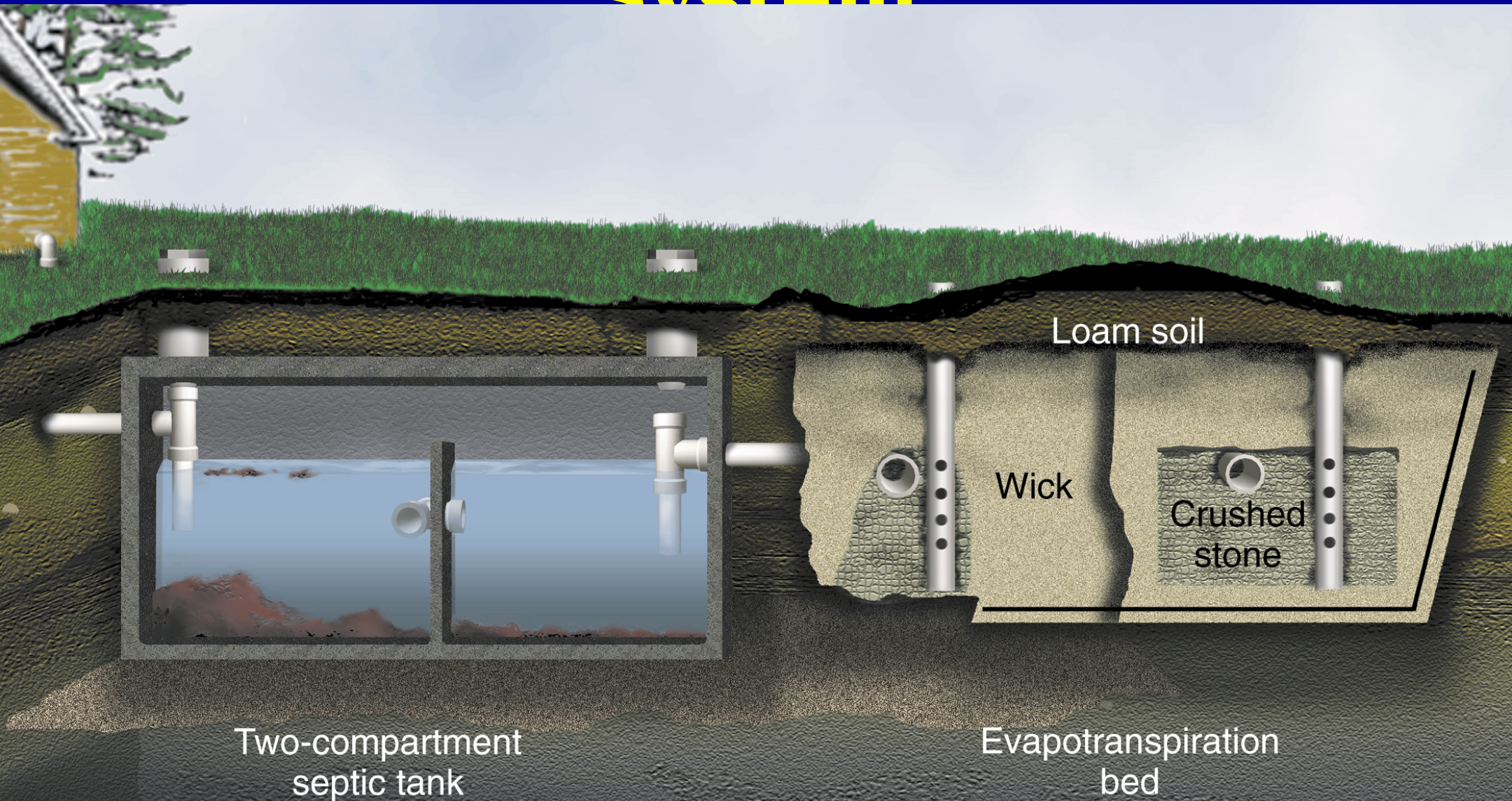


# Chamber Drain Field



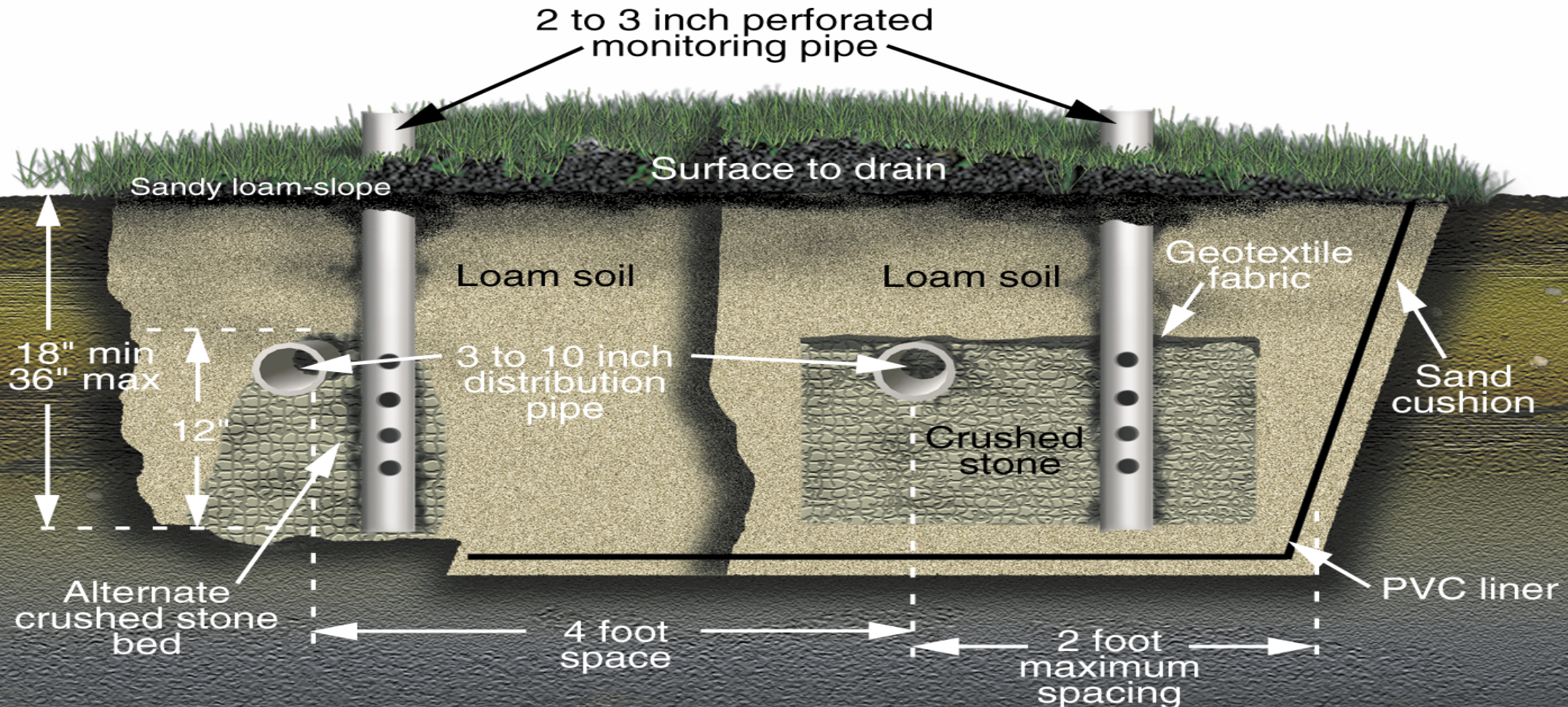


# Evapotranspiration Bed System





# Evapotranspiration Bed







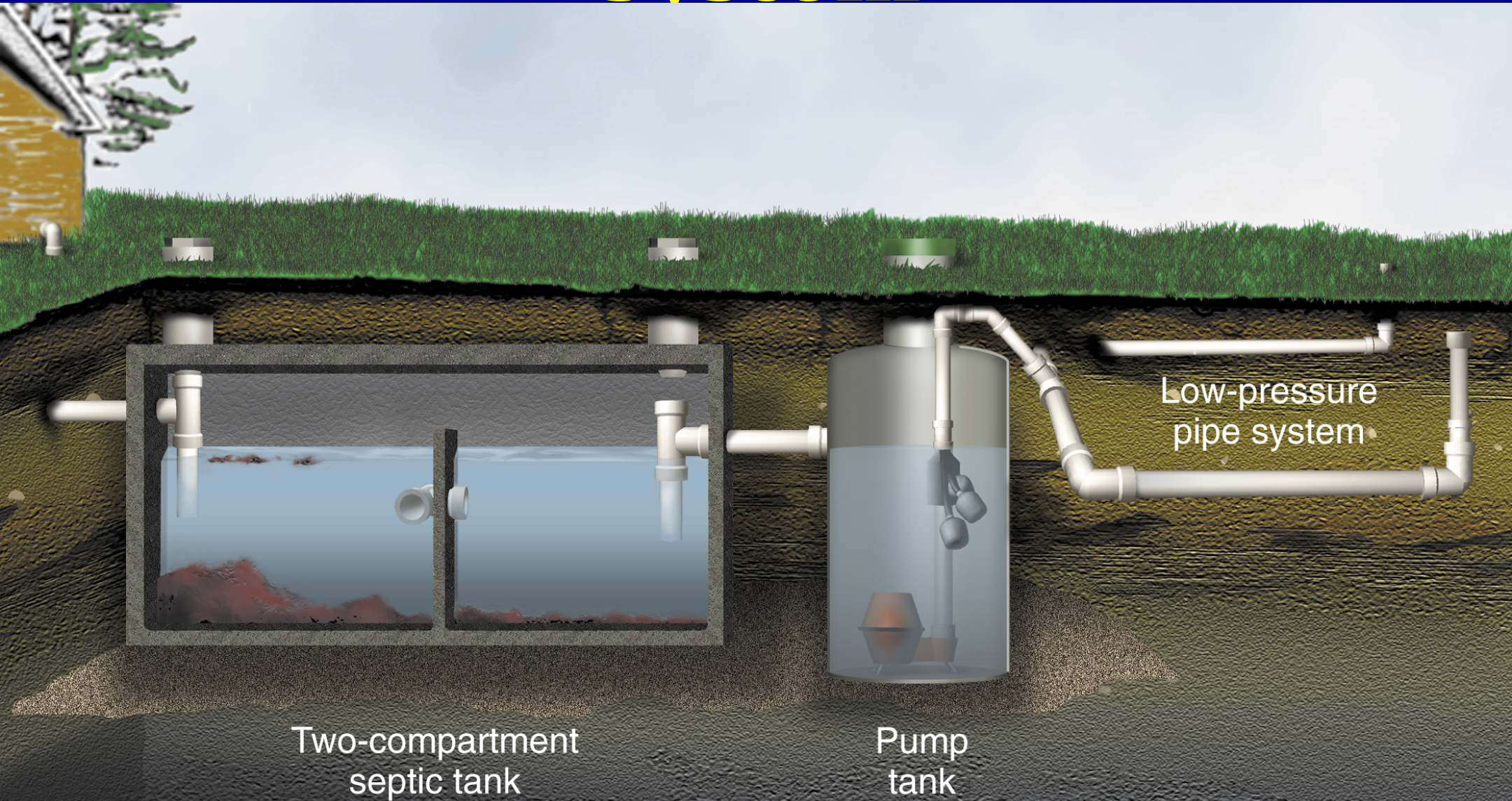
Evapotranspiration  
beds for storing  
water until  
evaporated from  
soil surface or  
transpired through  
plants.

Lined bed below  
trailers. Grass  
must be  
maintained to  
ensure vigorous



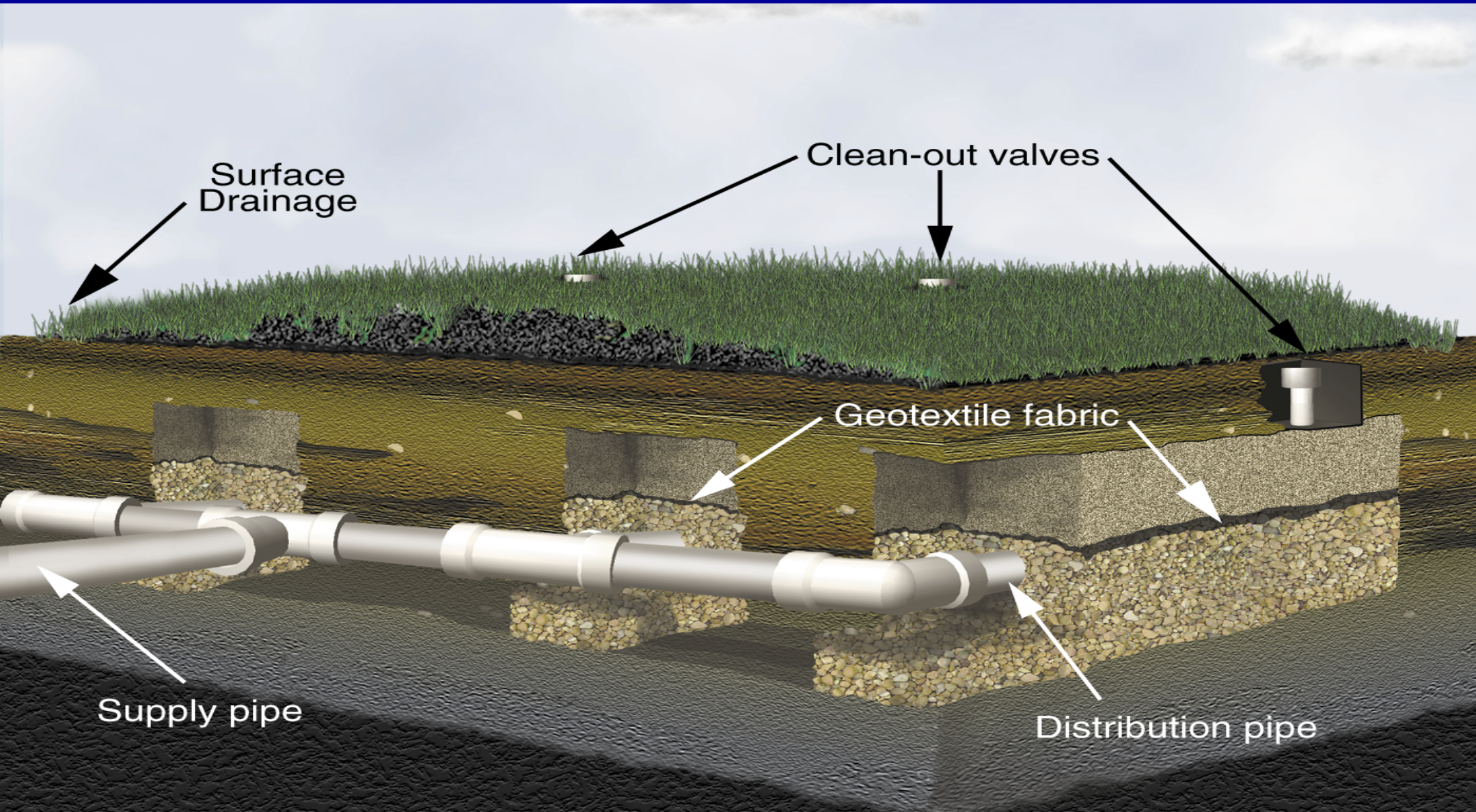


# Low-Pressure Distribution System





# Low-Pressure Distribution Drain Field





Low pressure  
distribution based on  
balanced flow of water.

Check for blocked  
emitters.

Flush lines.



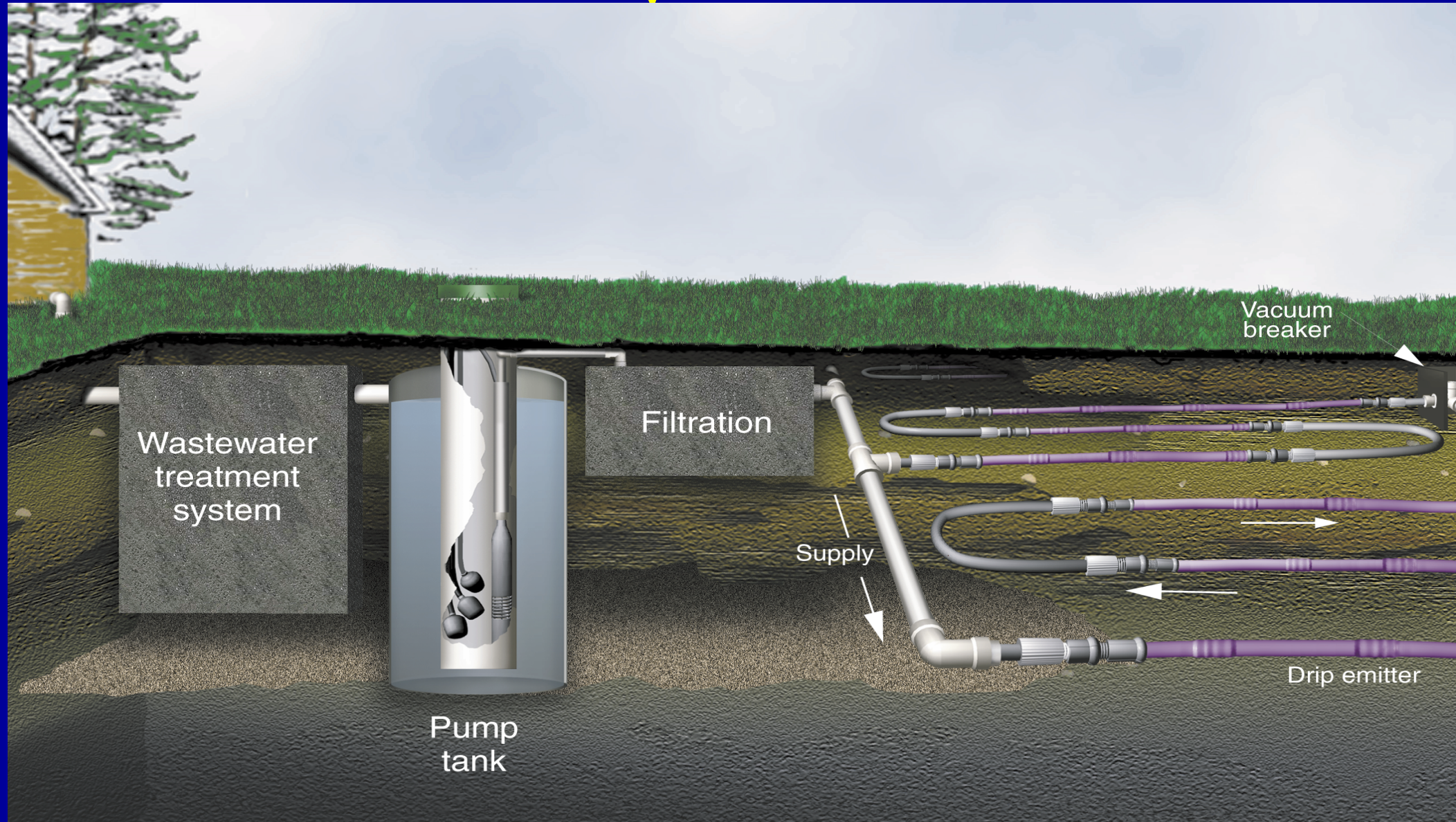


# LOW Pressure Distribution Drain Field





# Sub-Surface Drip Dispersal System





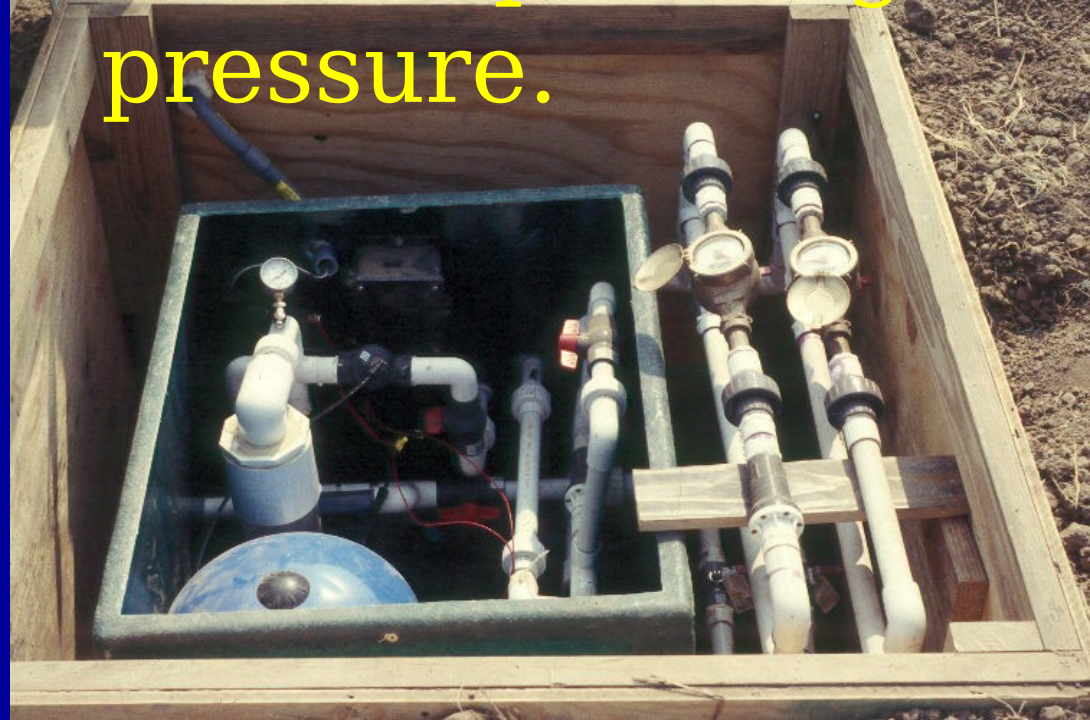


Check the control panel (pump run times, number of cycles, etc.)

Check operating pressure.

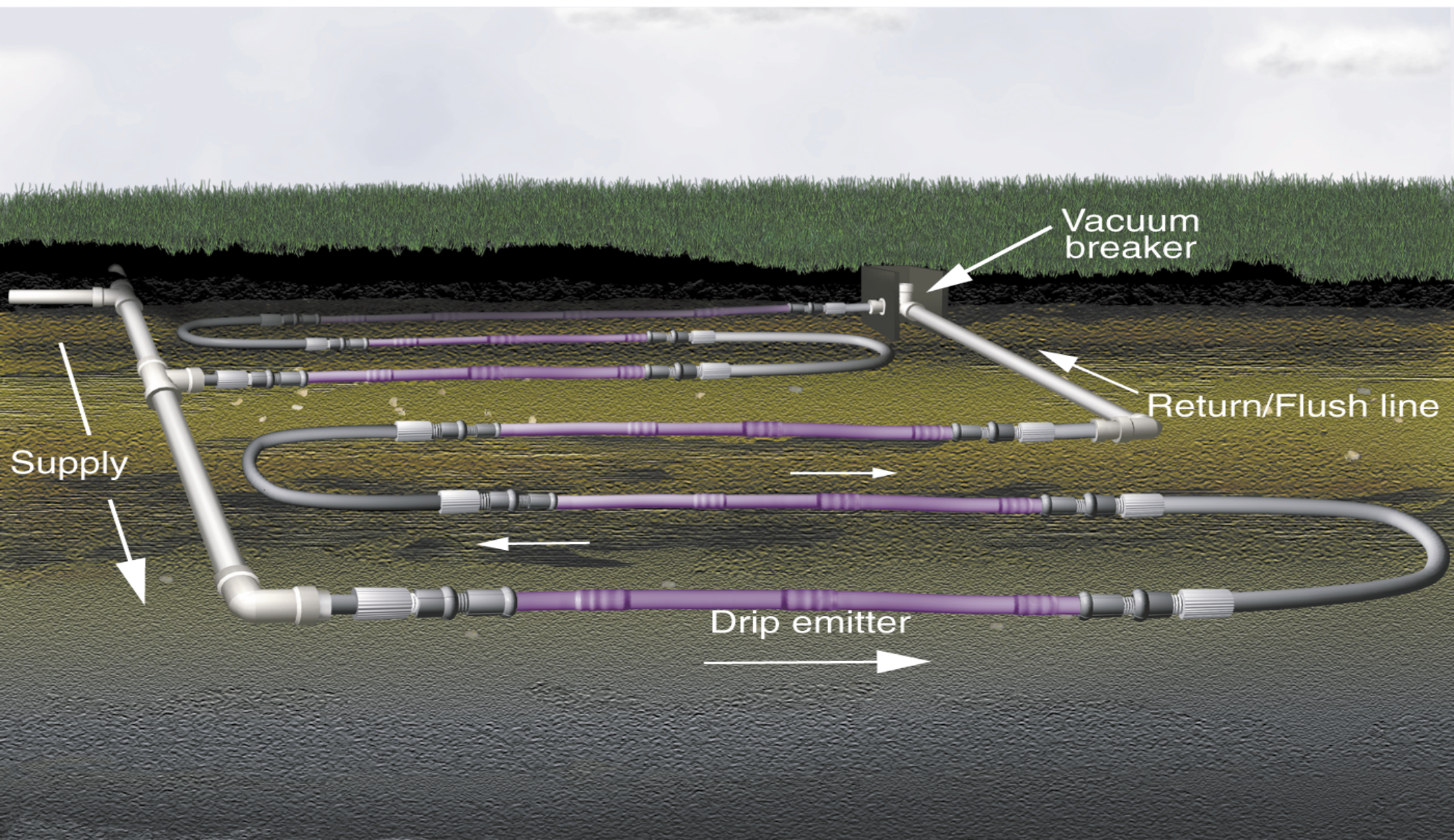
Check filtering system (make sure automatic backwash is functional).

Check the filter (and backwash)





# Subsurface Drip Dispersal Drain Field





# Subsurface Drip Tubing



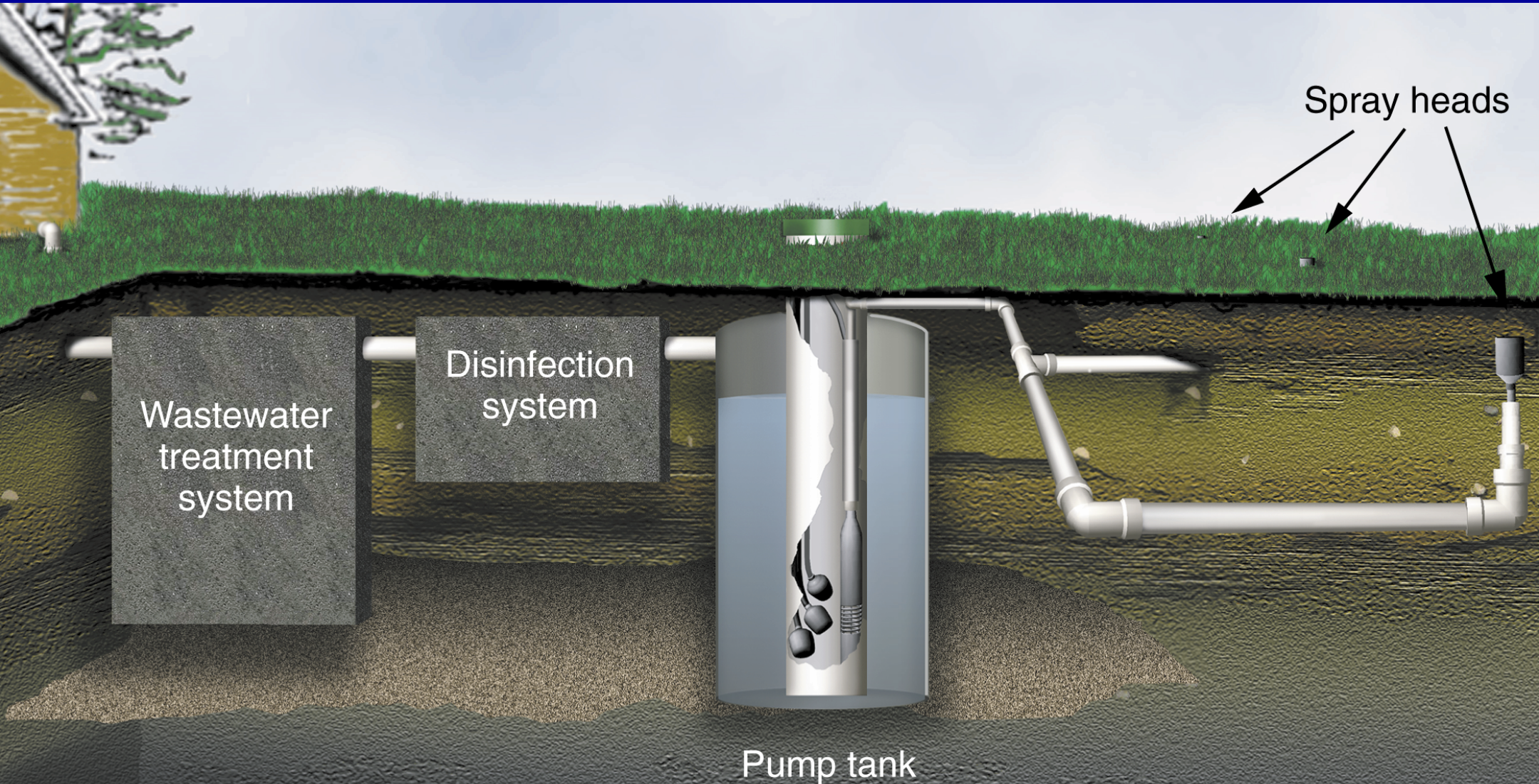


# Drip Dispersal Field at a School



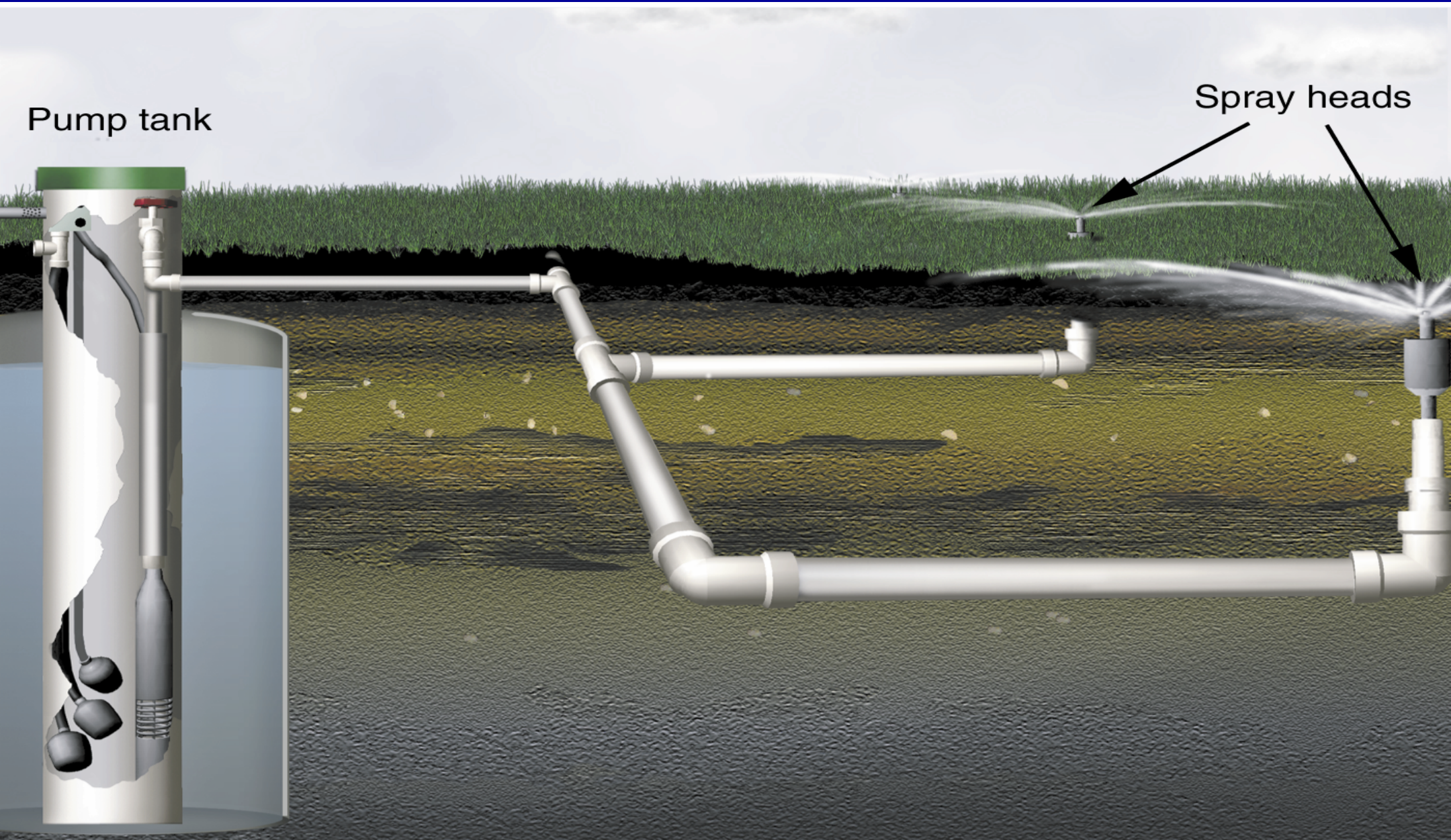


# Spray Dispersal System





# Spray Dispersal







Wastewater  
spraying in a  
landscaped  
bed and yard.

Check operating pressure  
of the system.

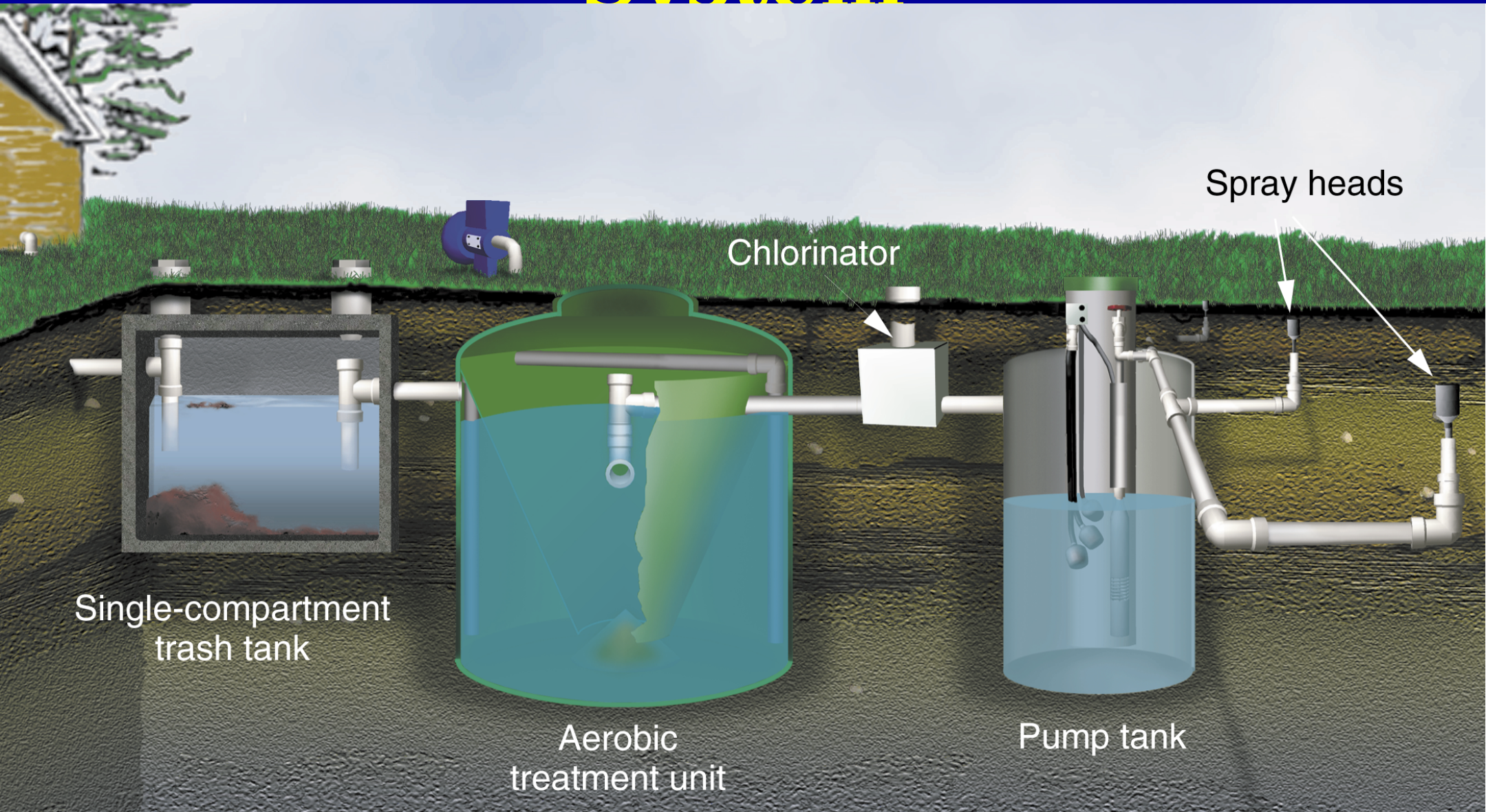
Check the spray heads to  
make sure they are not  
broken.

Check spray direction and



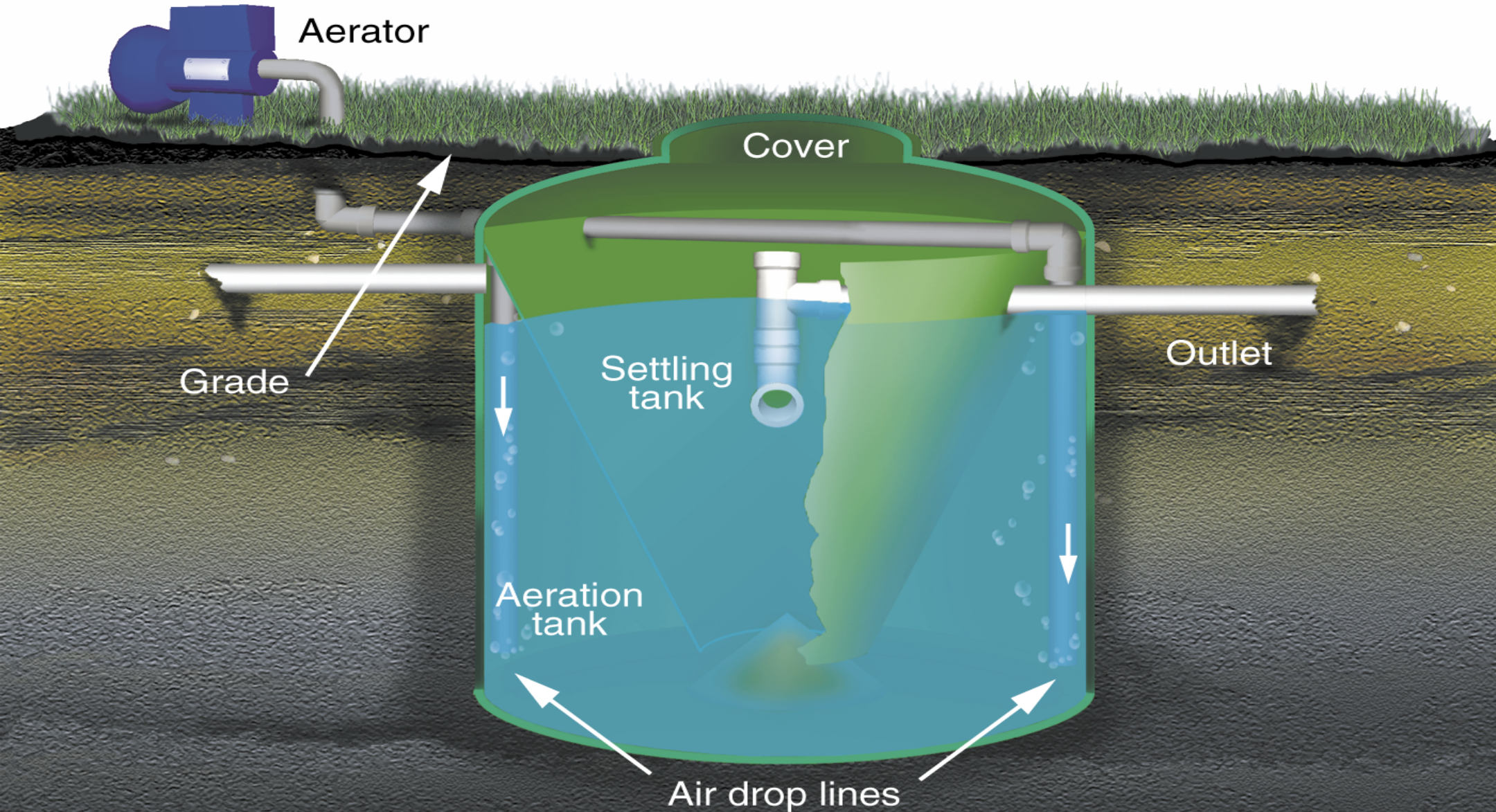


# Aerobic Treatment Unit System



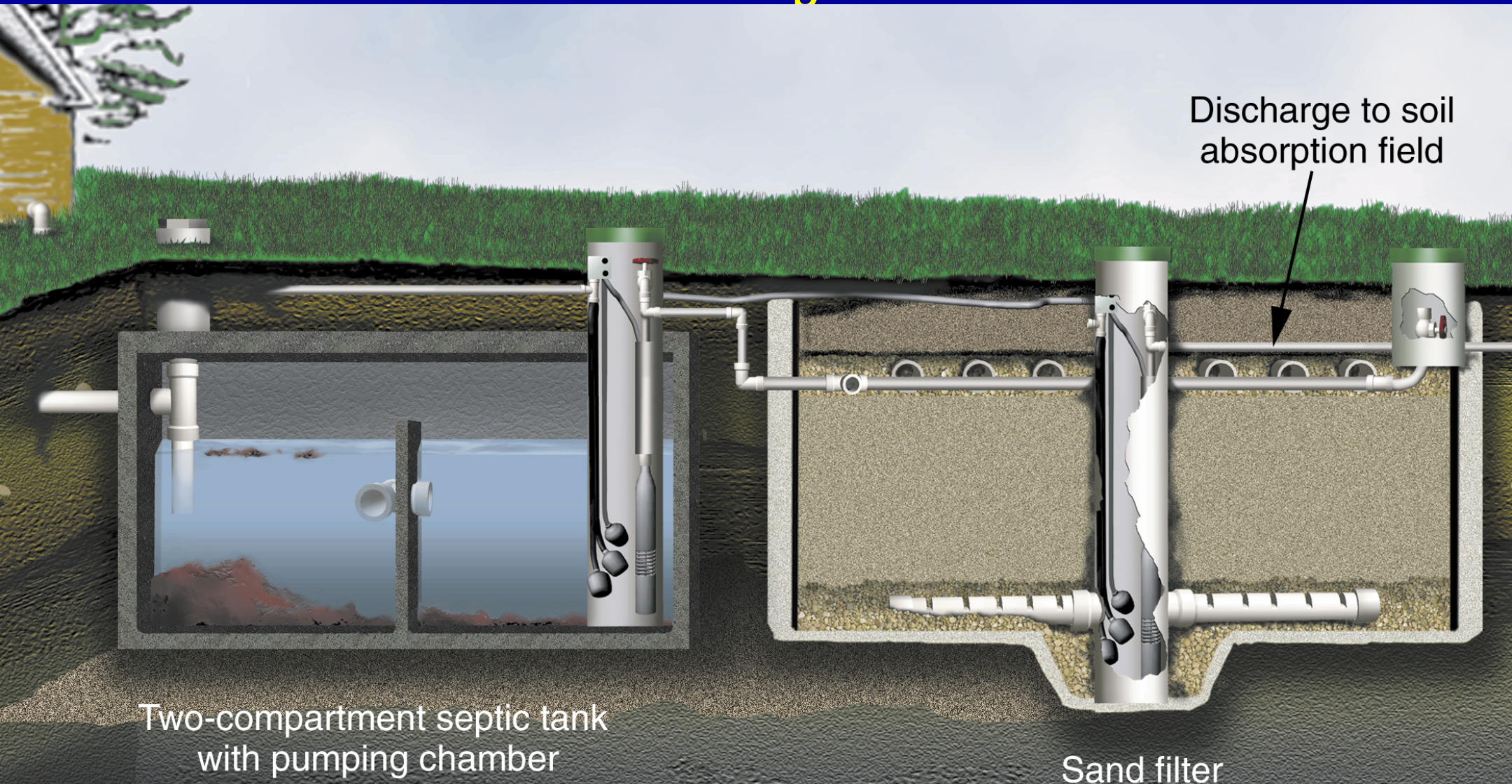


# Aerobic Treatment Unit



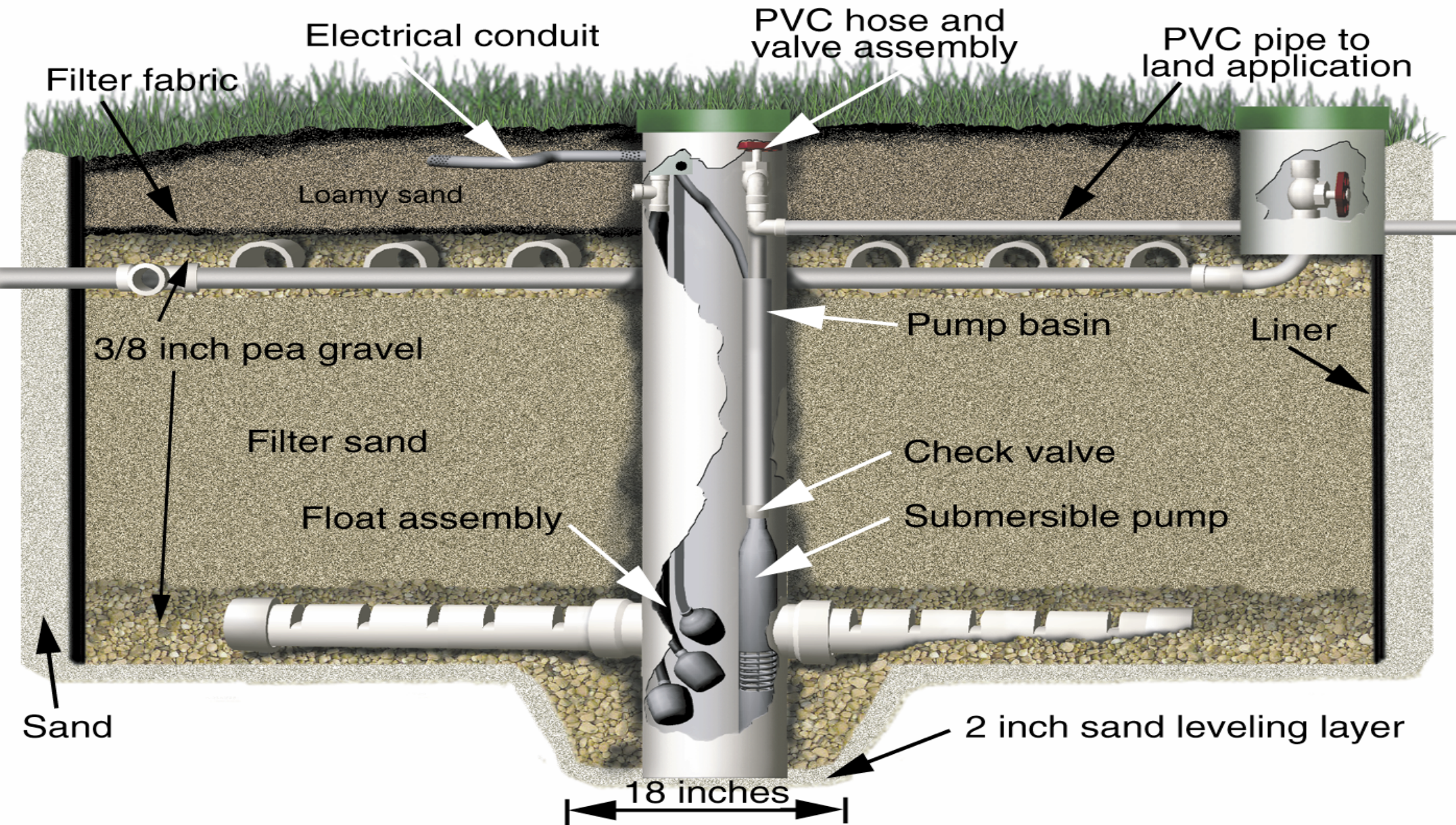


# Buried Intermittent Sand Filter System



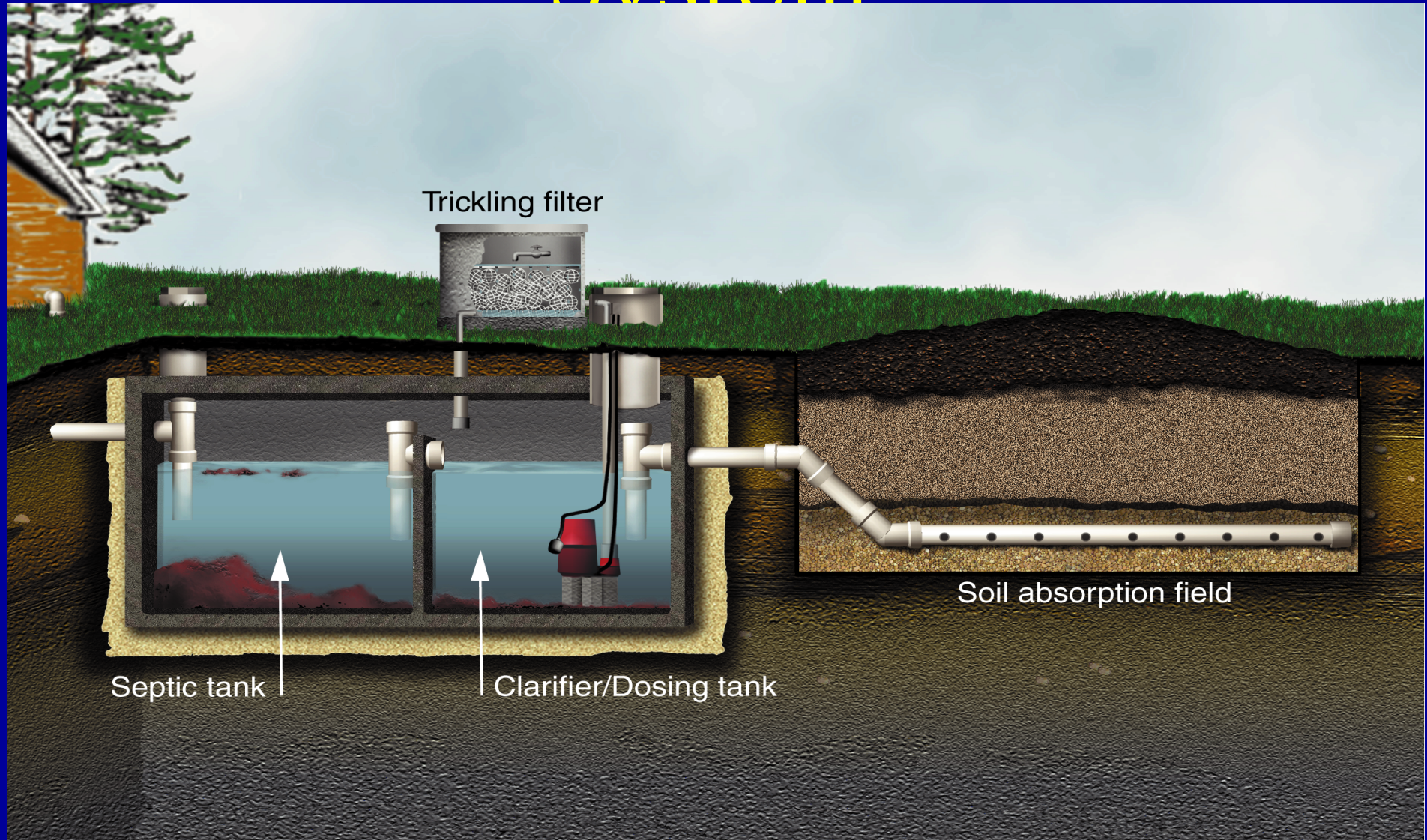


# Buried Intermittent Sand Filter



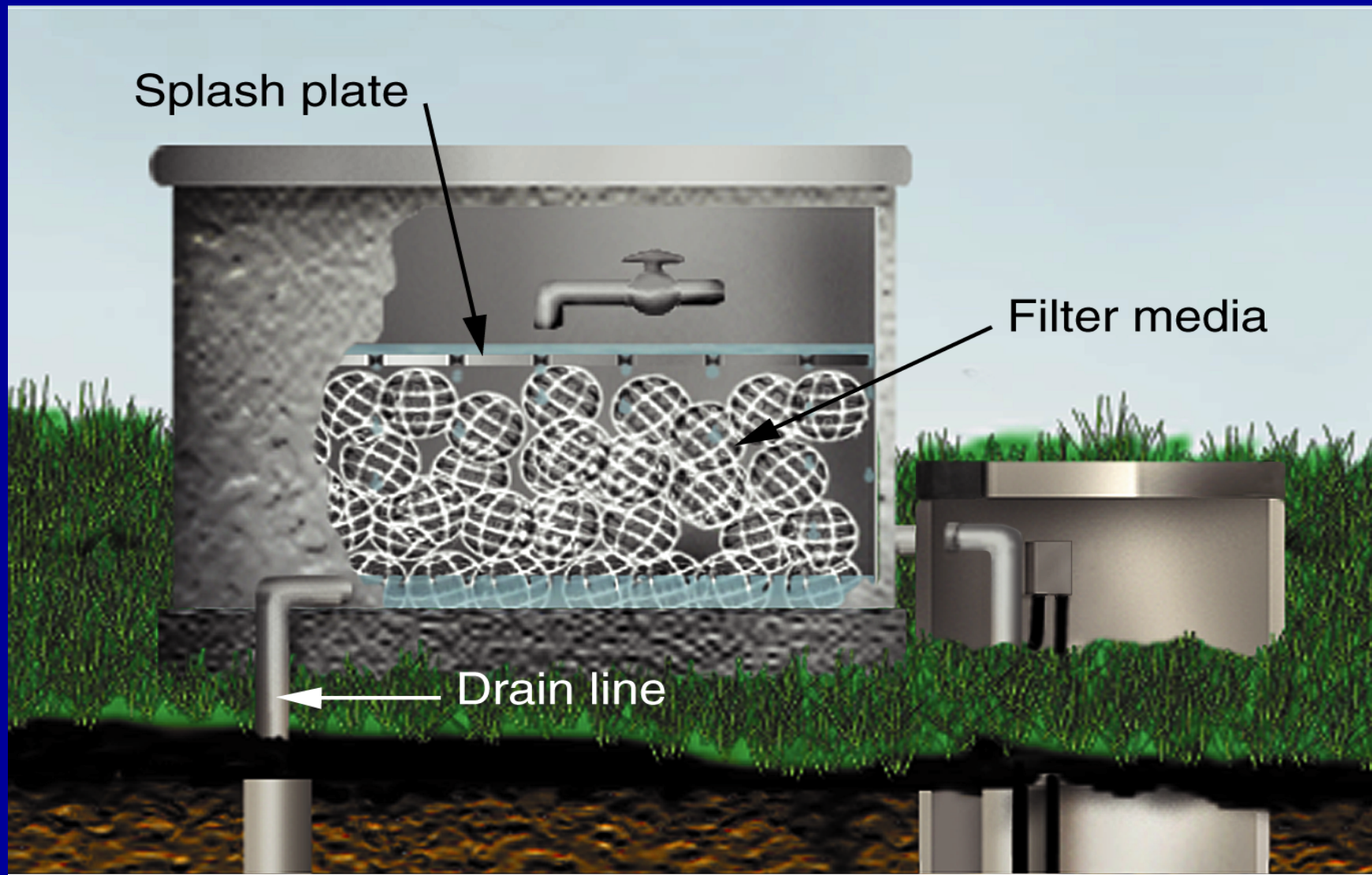


# Recirculating Media Filter System





# Recirculating Media Filter





# Gravel Media Filter







Sand filter  
needs uniform  
distribution of  
the water.  
Check loading  
rate on the  
media.

Check water infiltration  
into bed.

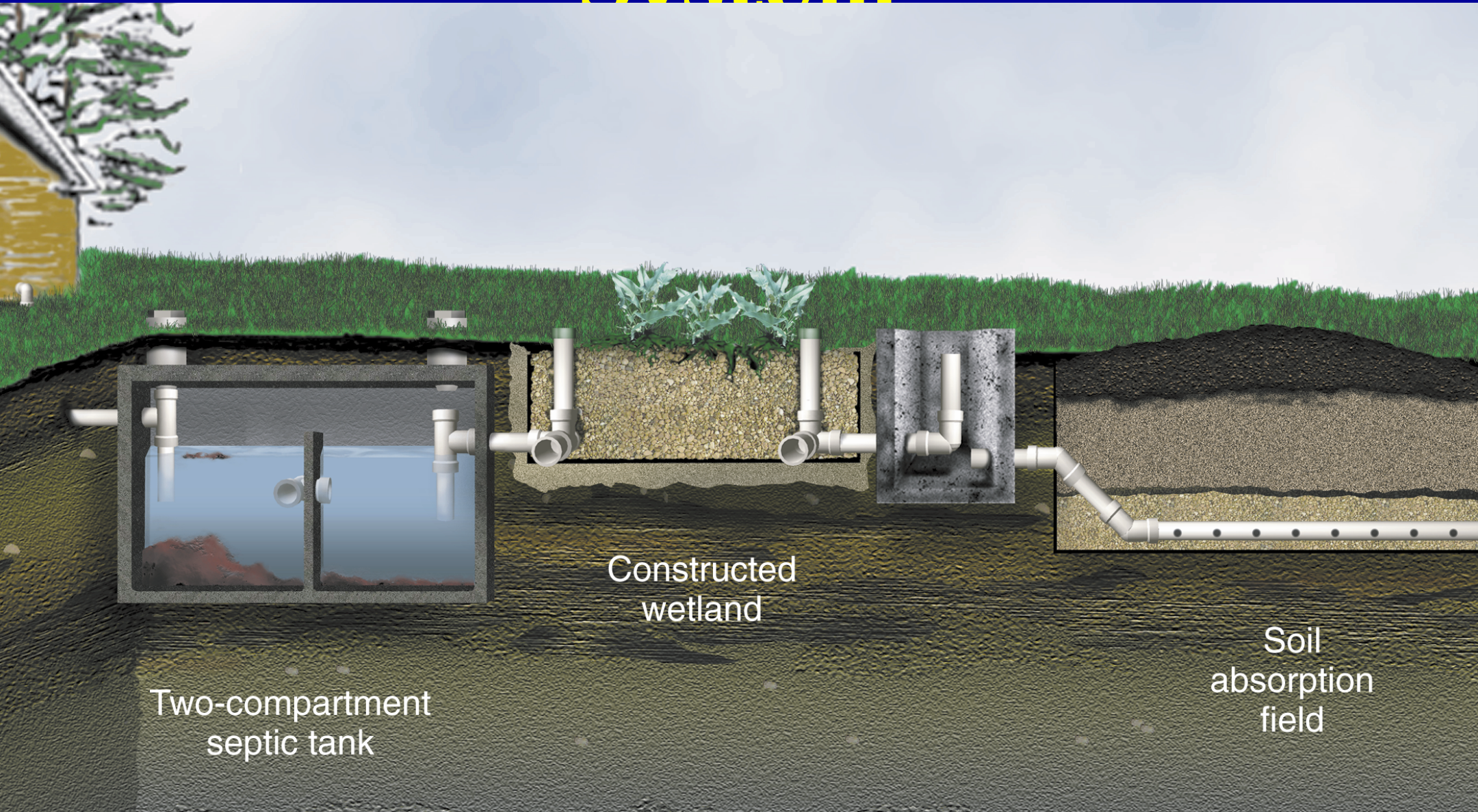
Disturb crust  
developing on the  
surface.

Replace top portion of



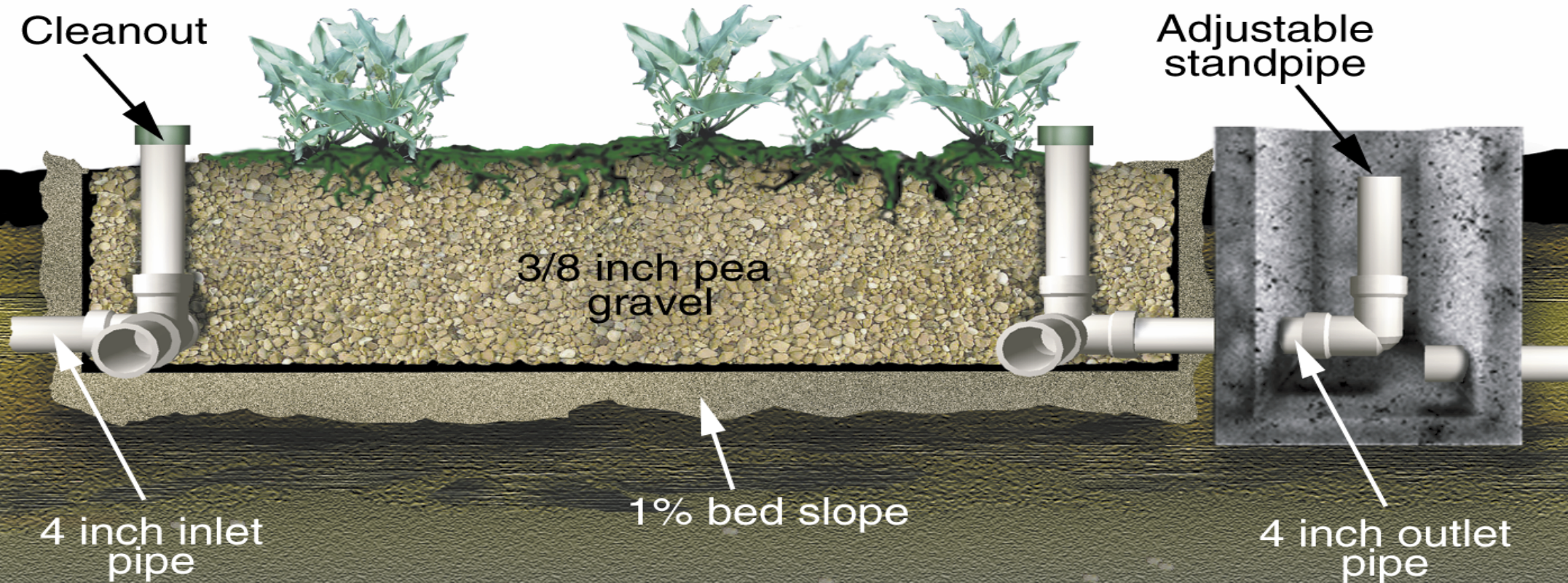


# Constructed Wetland System





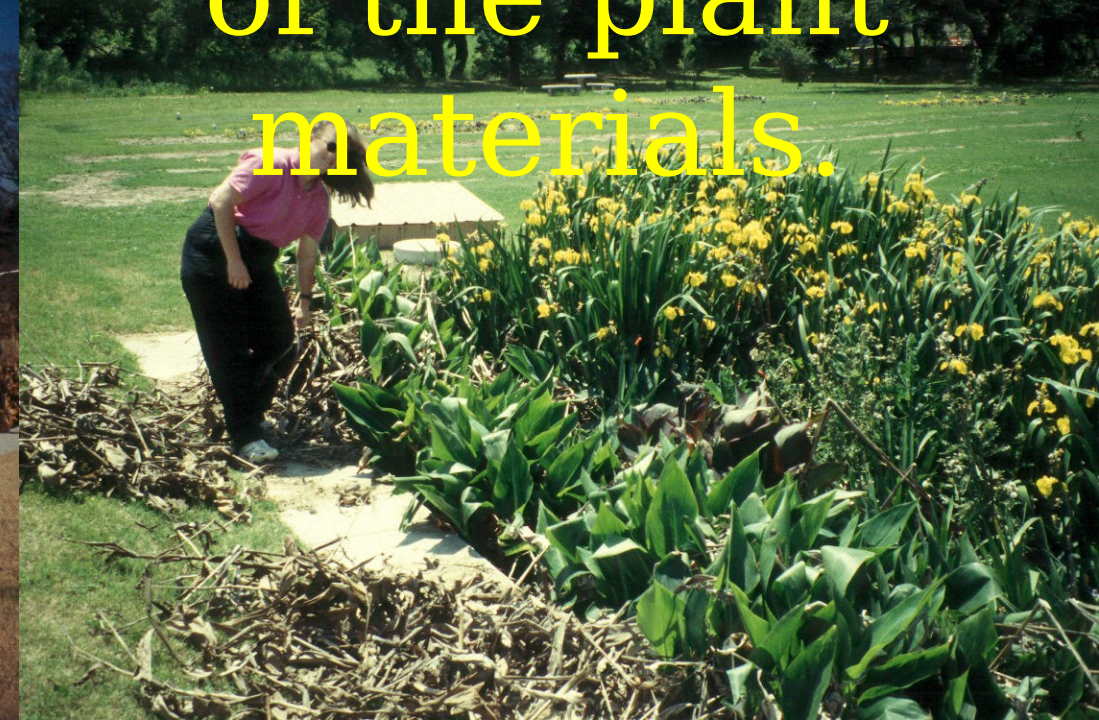
# Constructed Wetland







Wetland  
systems  
require  
management  
of the plant  
materials.





# Residential Constructed Wetland



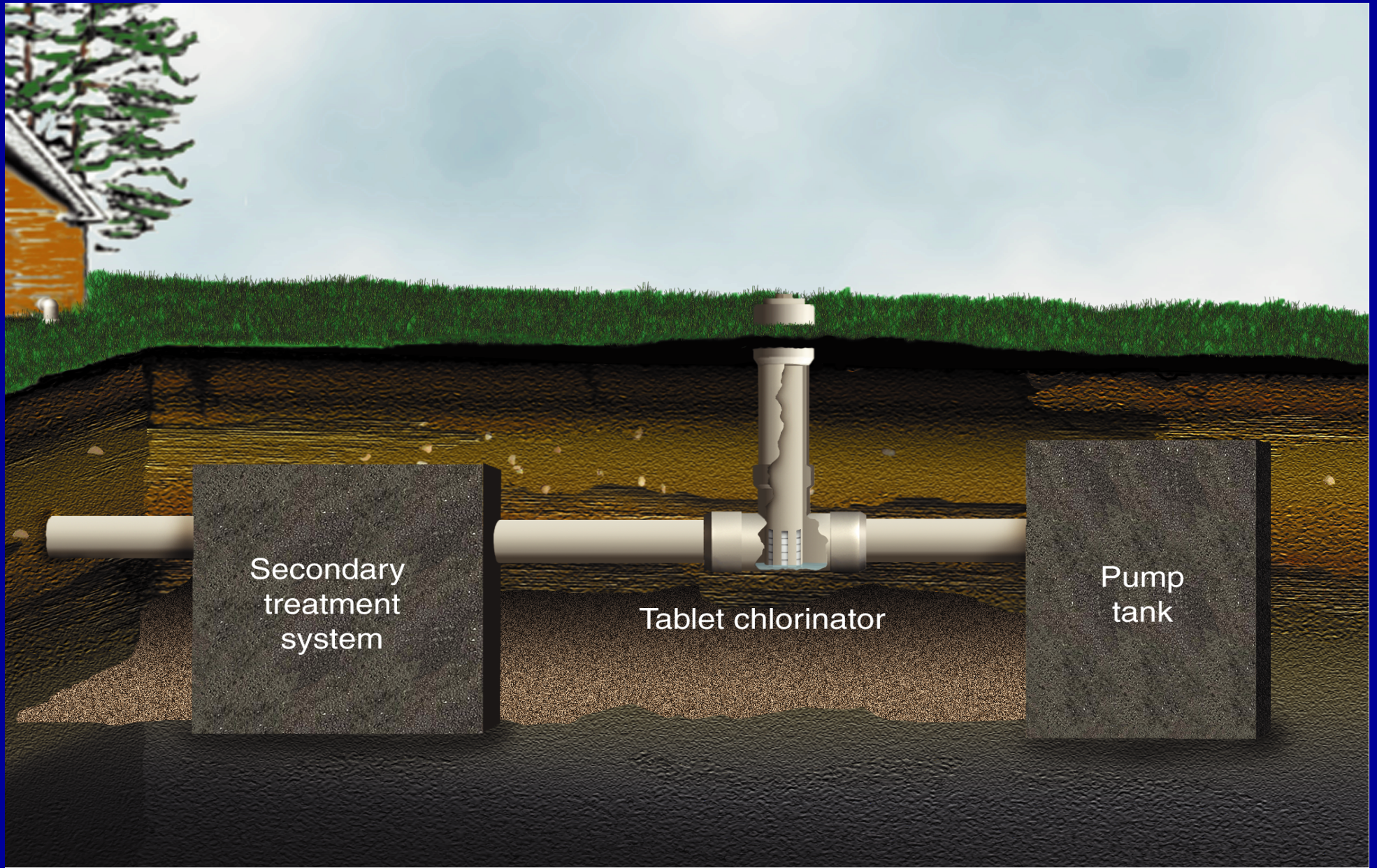


# Disinfection

- Chlorination
  - Tablet
  - Liquid
  - Gas
- UV Light
- Ozonation

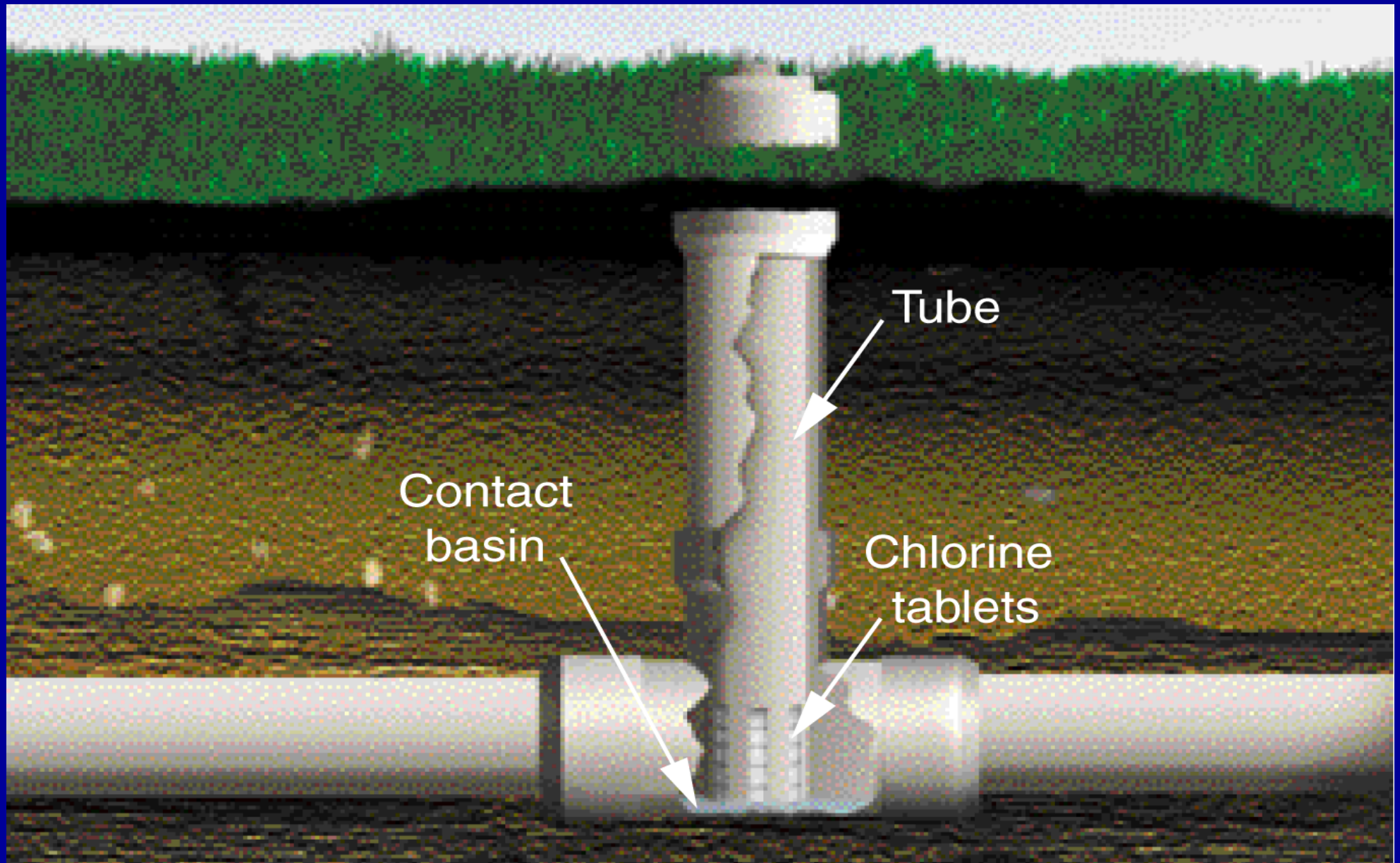


# Tablet Chlorination System





# Tablet Chlorinator





# Chlorine Tablets in the Stack





# Water Quality Monitoring / Operation and Maintenance

- Monitoring system performance
- All systems require operation and maintenance
  - Frequency
  - Types of activities
  - Types of inputs





# Summary

- A site evaluation is critical to determining the potential for a site to treat wastewater.
- Advanced pretreatment and final treatment and dispersal technologies are available for most situations.
- Select the most appropriate technology and scale of system for your site.
- Operation and maintenance is critical for long-term function